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Translation of anatomical terminologies in the Filipino language: A scientific-linguistic exposition and pragmatic compendium

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Abstract

There is a paucity of translation-related studies on anatomy and physiology course as contextualized in the Philippine education setting. This theoretical paper focused on the exposition of the nature and dynamics of translation and linguistics in the context of science education and arranged a practical compendium of Filipino translations for multi-organ system anatomical structures. The inquiry utilized various known translation approaches in the literature, such as (1) word formation; (2) decision-procedure; (3) discipline-driven; (4) meaning-based; (5) dynamic and functionalist; (6) literal; (7) oblique; and (8) inversion approaches, to come up with an appropriate translation for anatomical terminologies that will bridge the gap between the universal and native languages of interest. This scholarly undertaking is expected to benefit science educators, students, and language-related professionals in advancing the intellectualization of the Filipino language in biological science–anatomy and physiology education.

Keywords: *Anatomy and physiology, organ systems, Filipino, code-switching, translation*

1. Introduction

The employment of a native language, in addition to the widely acknowledged English language, is critical to the overall transmission of theoretical and functional knowledge and the purposeful facilitation of learning among students in any discipline (Khurana & Sharma, 2017).[*] The English language has been traditionally used to transmit scientific jargon to students in didactic and practical learning sessions (Tardy, 2004). Its parameters remain the authoritative voice on a global

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scale and are viewed as a strategic route for giving students in science-related courses a standardized understanding of the different terminologies being dispersed in specialized domains (Lodge, 2020). Recent inquiries have indicated that using the native language, equally and interchangeably with English per code-switching or language alternation schema (Shay, 2015), can potentially unlock a plethora of learning opportunities for students concentrating in the sciences or otherwise (Yassin & Chaaban, 2021). While educators and teacher education students are expected to possess technical knowledge on the specifications of the use of English terminologies and their appropriate translation in a given pedagogical and cultural context, in reality, the use of standardized science-related terminologies operating in the English language overshadows the use of localized terminologies in a socio-cultural reality (Owu-Ewie & Eshun, 2015).

Among the sub-fields of the sciences, the domain where Filipino translation of various terminologies can be greatly appreciated is skewed towards the subject of biology—anatomy and physiology (the study of the structures and functions of the human body), in particular. Although it is true that there are existing translations of official anatomical terminologies found in dictionaries and language society-commissioned academic webpages to the Filipino language (See UP Diksiyonaryong Filipino [Almario, 2001; 2010]), they exist as staggered, assorted, and loose translations of words and phrases, along with generic and interdisciplinary words, to the language of interest. There is a paucity of empirical and/or theoretical attempts that exclusively cater to assembling a one-stop yet comprehensive exposition and compilation of anatomical terminologies in the context of science education and Filipino translation. Unpacking the fundamentals of the Filipino equivalent of certain anatomical terminologies is foreseen not just to enliven the lexicon specific to the Filipino pedagogical worldview. It is expected that once these linguistic cornerstones have been laid out, the propagation of the use of the Filipino language in anatomy classes will be viewed in a more meaningful way. It will resonate with the indigeneity and cultural consciousness of teachers and learners. Parallel to the efforts of other developing countries, such as Africa, in advancing indigenous perspectives by using their own language and colloquialisms to present alternate yet valid interpretations of English anatomical terms (Madzimbamuto, 2012).

As this scholarly initiative remains a blind spot in the Philippine educational context, this theoretical paper has focused a generative lens to present salient themes culled from the codified body of knowledge pertaining to the Filipino translation modalities apt for the sciences and science education; the significance of using the native language and code-switching in teaching sciences; and above all, the paper typified the Filipino translation of anatomical terminologies in various organ systems of the human body. At large, this pragmatic compendium and pedagogical exposition are expected to directly benefit pre-service and in-service educators, learners of all ages, language and translation professionals, curriculum engineers, and instructional developers. While it is foreseen that it will have a manifold impact in the Filipino local educative context, most especially in teaching anatomy classes, such a landmark study can also benefit the global readership in language learning and science education communication as they can delineate the intricacies and amplify the variety of the terminologies embedded in the Filipino setting to enrich the educational outcome for learners. Considering its inclusion in meta-analytic, transdisciplinary, and comparative studies on biological-anatomical vernacular and linguistic science teaching praxis far and wide.

2. Pedagogical backdrop: Languages in the context of the science

Both the Filipino and English languages are tagged as the official languages of the Philippines, albeit the former has been designated as the national language (Esquivel, 2019). Bercasio and associates (2016) have typified that as early as the pre-service teaching years of would-be educators, they should develop a pedagogical mastery and command of both English and their natal tongue in unlocking constructs and teaching a lesson. Not only to instill bilingual or multilingual proficiency in the students as a product, but also to assist them in developing holistic literacy in the process. In the Philippine setting, the most recent law that governs the professionalization of teachers, Republic Act No. 10533, or the Enhanced Basic Education Act of 2013, Sec. 5(f), rallied for the greater use of the '*mother tongue,*' whether in the form of Filipino or its regional variants and/or dialect, in the learning delivery system of academic organizations. While these realities exist in the parlance of the operational and pedagogical fronts of teaching sciences using the Filipino language, the use of English terminologies is still implicitly preferred over the Filipino vocabulary by educationists and practitioners in the classroom setting for the general, pure, and applied sciences for several reasons: convenience, acceptability, and widespread understandability (Taguchi, 2014).

Whether inward-tending or outward-looking, bilingualism and multilingualism are not the end-all and be-all of being and becoming an effective science educator or communicator (Kirss et al., 2021). However, interweaving the standardized science terminologies and the localized translation of these words suggests a deep reverence for their first language (Bonney, 2015) and the essence of its intellectualization (Sibayan, 1999). By the same token, it implies that science is best experienced by the students when the language used in every teaching strategy, technique, or approach is firmly imprinted on their persona as cultural learners (Garcia & Pantao, 2021). In a deeper plane of thought, it advances the epistemology of a technical course in a country in the far east in a more eclectic manner, as learning should remain context-driven and responsive to the culture of the prime recipient of the educative process (Brown et al., 2018). As this venture remains underrepresented in the Philippine context, accentuating the Filipino language as the medium of instruction and the language of learning presents a promising avenue where the educational sphere of the sciences can be optimized. Therefore, achieving a fertile ground for insights that can culminate in a myriad of contextual richness in understanding a technical science lesson.

The authors, being comprised of in-service and pre-service science teachers, contend that there are nuances and peculiarities specific to the Filipino language that can deepen how the anatomy and physiology course is being taught to Filipino students. While most basic and higher education institutions in the Philippines rely on tangible studies published in reputable journals enhance their avowed curricular and instructional improvement practices (Simonsen et al., 2008; Alsowat, 2020; Diery et al., 2021), the formal publication of a conceptual paper which provides an in-depth account of the significance of using the native language in teaching anatomy and physiology and an itemized discourse on the anatomical terminologies with specific Filipino translation can finally resolve the missing link as to why, up until this day, such advocacy has not gained any scholarly traction or been actualized. In a prospective purview, it has the potential to empower Filipino science educators to consider utilizing the exact and closely related translation of English anatomical terminologies in their respective science classes, as well as to serve as a catalyst for the organized dissemination of the Filipino terminologies available in the classroom. Not to mention the potential empirical papers that can emanate from such a pioneering action in the domain of linguistics on science education in the Philippine context that scholars can use as their point of departure in their future studies.

3. Significance of utilizing the native language in teaching science/anatomy and physiology

The use of a native language is an integral component of the teaching and learning process. On a bigger scale, native language training emphasizes the value of a language and its culture while also preserving it for future generations (Bradley, 2019). Oyoo (2020) argued that students who are taught in their mother tongue have an edge over those who are taught in a second or foreign language. Consequently, pupils believe that they would learn faster if scientific knowledge was provided in their natal tongue or if elucidations were drawn from indigenous sources (Madzimbamuto, 2012). Similarly, van Rooyen and Jordaan (2009) explicated that when the mother tongue language is employed alongside the primary language of learning, commonly English, it promotes faster learning on the part of the learners.

Chapman and collaborators (2017) have indicated that classroom language instruction influences the students' scientific learning, and perceptions and inclination toward science. Accentuating it further, it can be inferred that utilizing the native language in teaching science, specifically anatomy and physiology, propels the enrichment of knowledge and ascertains the engagement of students in such a technical course. The fact that the core language of science is the English language, the need of translations and bilingual learning terms are a challenge that Filipino teachers and learners typically face. Bradley (2019) reported that in other developing countries, such as Botswana, universities only teach Setswana and English, the native and the ethnic majority languages. In a stark contrast, in a study conducted by Morrell and collaborators (2019), they were able to highlight the effects of the implementation of the Dual Language Immersion Program in an industrialized nation, wherein they met the requirements of children in a class who speak a primary language other than English and encouraged multilingualism among English learners and native English speakers.

Moreover, the use of the native language in teaching science and/or anatomy and physiology provide much engagement for the learners due to their familiarity with the language. Considering that the Filipino language is the language Filipinos use in their everyday correspondence, schooling, and non-scholastic engagements, Reyes (2010) stated that young students, particularly the ones in the elementary level, can comprehend and express their thoughts better in Filipino than English. They also found out that when the lesson proper and instructions are cascaded in Filipino, students can answer more quickly during recitations and perform well when given instructions, which yield higher test results. The learners are also more at ease, confident, and enthusiastic about answering and participating. In a directive released in 2016, the Department of Education reamplified the use of the mother tongue in early childhood education due to the enactment of the mother tongue based–multilingual education facet in the Enhanced Basic Education Act of 2013. Such a kind of advocacy requires the learners to thoroughly engage with knowledge presented in one language before expressing it correctly in another. It is foreseen that the scientific conversation in Filipino will culminate in a greater understanding of the lesson. Hence, the use of the native language is a potent starting point in teaching science, specifically basic biology and, later, anatomy and physiology. As Bradley (2019) noted, once the curriculum and instruction are in their native language, being culturally responsive and respectful of one's native language are not farfetched.

The use of Filipino translated anatomical structures is believed to be an effective foundation in understanding more complex anatomical terminologies. At the onset, since students

of basic education are not yet very proficient in reading, speaking, and writing in English, it would be much better to use a guide that shows the English-Filipino translations of the different parts and structures of the body. This way, students will not only improve their vocabulary but also become more engaged in understanding those body parts in the latter phase of their schooling. There are also Filipino terminologies that students usually encounter in their hometowns that are commonly used than the English ones, particularly terms of body parts that can easily be seen, such as in gross anatomy. Young learners start their journey of familiarizing body parts when they are described first using their mother language, before they learn their corresponding English translations. Therefore, it would be more strategic if the disciplinal content of science teachers, particularly biology teachers and anatomy and physiology professors, must include both English and Filipino terminologies in presenting the multi-organ system anatomical structures.

4. Code-switching in the facilitation of learning

The Philippines is said to have an unrecognized linguistic problem because the development of the Filipino language is frequently overshadowed by the development of the English language (Donoso, 2012). When it comes to linguistic policy and global multilingualism in the context of the Philippine setting, Filipino is one of the world's super languages because of the one-hundred million people that use it as a first or second language. However, despite this promising front, the situation is far from ideal. Due to the major language dichotomy, marginal literacy issues, incorrect utilization of language in an academic context, diglossia, and code-switching confusion, the unsolved problem of Philippine linguistics continues to occur. Hence, this segment identified the effects of code-switching in the educational context while teaching science concepts locally and internationally. It will also discuss the effects if the English scientific concepts are not supported by the information in the students' mother tongue.

Using code-switching in the classroom, according to Abad (2010), promotes effective discussions on difficult concepts in mathematics and science. It also creates a low-anxiety classroom climate that is conducive to learning. However, Abad (2010) further contends that frequent usage of code-switching in highly technical subjects like science can be detrimental and can cause confusion to students, which can lead to their misunderstanding of complex constructs. This proposition supports the idea that scientific topics in the English language will not be adequately reinforced unless they are backed up by gradually infusing the vernacular that they are familiar with in their daily lives.

In the Philippine setting, code-switching is deemed a typical activity where teachers are allowed to use two or more languages to communicate with their students. Miranda (2015) imparted different approaches to developing the Filipino science vocabulary. He demonstrated how to create local words by combining Filipino terms, like '*aral-ibon*' for ornithology or by mixing and matching syllables, just like in '*sunlad*', short for '*sunod-sunod na pag-unlad*' or evolution. Mangila (2018) extrapolated that code-switching in the Philippine classroom discourse has become a challenging problem because Filipino teachers are expected to use English exclusively when they are assigned to teach content courses like science. Borlongan (2009) shared that most teachers use code-switching and violate the English only policy in the classroom setting. In places like Manila and its surrounding regions, using *Taglish* has been a prevalent practice in academic contexts, which makes code-switching become "the unmarked code of choice." Inversely, while code-switching appears promising, other scholars have disclosed that using code-switching can be disadvantageous when expounding natural science constructs. Grobler (2017) divulged that in South Africa, albeit considered a multilingual country with 11 official languages,

English is the dominant and frequently used language in teaching. Natural sciences teachers in such schools avoid the use of code-switching because the policy is to use English solely as the medium of instruction. In the same vein, Malaysia is also tagged as a multilingual country, but in contrast to South Africa, most of the teachers are allowed to speak in both English and Malay.

Msimanga (2013) stated that although code-switching in a science pedagogical context is gaining popularity, it also bears tinges of restriction because not all students have the capability to negotiate two languages, especially if the said students are not adequately capable in the second language, and this is typically the case when the language of teaching is not the learners' primary language. If such a condition is not properly resolved, students might have difficulty absorbing the lesson, and this might lead to a negative impact in their performances and authentic learning. To sum, there are merits and demerits to using code-switching in the classroom setting, especially when discussing science concepts. This is not surprising because each student has their own preferred language for how they will seamlessly absorb the scientific concepts, even if it is too technical. But in many situations, particularly in the Philippine context, code-switching has become a strategic tool to help learners who are struggling to understand difficult concepts and to engage in the lesson.

5. Multi-modal approaches in Filipino translation

Intellectualization refers to the idea of lexical enrichment or vocabulary extension to make a language more precise and accurate while simultaneously abstracting and broadening it (Bautista, 1988). Translation is one of the avenues noted in the literature to continuously intellectualize the native language of interest. Gonzales and Bautista (1981) suggested three of these approaches: the word-formation approach, the decision-procedure approach, and the discipline-driven approach.

5.1 Typical approaches used in Filipino translation

The word-formation approach. The science committee of the *Akademya ng Wikang Pilipino* (Filipino Language Academy), which was founded by the UNESCO National Commission of the Philippines in 1964, adopts the word-formation approach. This type of approach was based on the *Maugnayin* method. The *Maugnayin* method, as defined by Del Rosario (1968; 1981), emphasizes the distinction between 'names' and 'terms.' The 'names' of "elements, things, equipment, measurement, animals, plants, and other touchable or tangible objects", according to Del Rosario, are arbitrary, and their form or structure cannot be explained. Because names lack clear etymologies and are isolated or unrelated to other names, they are frequently taken from other languages if no native counterpart exists in the input source language. To illustrate, the word appendix is translated into *apendiks*. On the other hand, Del Rosario (1968; 1981), emphasized that the 'terms' employed for "principles, ideas, concepts, events, methods, forces of nature, teachings, and other non-tangible and non-visible relations" must have a form or shape that can be explained. Terms must always be constructed from preexisting roots, whether native or borrowed, to which people add their own affixes or compounding elements using the grammar of the language. As a result, the consistency and interconnectedness of terms and terminology remain relevant.

In line with this, the primary source of word-formation approach is affixation. Affixation is a morphological process that involves the attachment of a bound word or phrase to a morphological base (Goethem, 2020). In the primary source, the suffix *cardium*, meaning heart, is translated into *puso*, and in pericardium, *saplot/supot-supotang nakabalot sa puso/perikardiyo*,

and in endocardium, a *manipis na bambam sa loob ng puso/endokardiyo*, and lastly in myocardium (muscular tissue in the heart), a *miyokardyum/miyokardiyo*. Although all these words have common suffixes, their translations greatly depend on the prefixes that are associated with the input source language. Another relationship is the second rich source, it is the use of combining forms, for example the word media- and meta- in mediastinum and metaphase, in Filipino terminologies, the mediastinum is translated into *mediyastino* and metaphase into *metapase,* all of these are pertaining to the middle.

The decision-procedure approach. This approach, as amplified in the work of Otanes and colleagues (1977) and Santiago (1981), employs a field-tested algorithm to select the most probable acceptable forms for the technical terminology from a variety of alternatives. In this alternative, general guidelines are suggested in translating input source of language into its target receptor. First, it is recommended that while translating English into Filipino terminologies, people must establish whether there is an adequate current and existing Filipino term (e.g., eyes is translated into *mata*). However, if this alternative is not suitable, then people can utilize the Spanish etymology with respelling. Throughout antiquity, the Middle Ages, and the Renaissance, Latin was the *lingua franca*, and English and other Western-European languages borrowed many words from Latin and Greek. Thus, it is noticeable that most scientific terms that one might come across are Spanish in origin. Moving forward, in Filipino translation utilizing Spanish with respelling, it is also conceivable as most of the words have Spanish origin (e.g., Pulmonary; *pulmon* [Sp.], and is translated into *pangbaga*, pertaining to lungs).

Moreover, when the two (2) guidelines aforesaid are not feasible, then it is applicable to utilize English word with or without respelling. Likewise, in the respelling of words with Spanish origin, whether the generated form can be easily retrieved from the original, one needs to re-spell the English word with fewer modifications in the structure. From this modification, the letters 'c', 'f', 'j', 'v', and 'z' are typically replaced as 'k', 'p', 'h', 'b', and 's', respectively, because those letters are not present in the Philippine alphabet. For instance, cartilage is translated into *kartilago*; trachea into *trakea*; and trapezius is translated into *trapesyo*. Likewise, 'io' is changed into 'yo', 'ie' into 'ye', 'que' into 'ke', and 'x' into 'eks' such as appendix, which is translated into *apendiks*. On the other hand, another method is to employ a vernacular phrase, a coined term, or a historic Tagalog term, whichever is more appropriate. For example, *dalubsakit-babae* (Expert on diseases of women/See OB-Gynecologist) originates from *dalubhasa* (expert), *sakit* (sickness), and *babae* (woman). Furthermore, another technique is to mix these sources by combining Filipino prefixes known as *panlapi* in both Spanish and English words. Thus, the translation of the word pulmonary into *pangbaga* is possible by combining the affix *pang*- in addition to the Spanish equivalent of lung.

The discipline-driven approach. Enriquez (1981) discussed the discipline-driven approach being called this way because it was based within the framework of a given discipline. Unlike the word formation and decision-procedure approaches that start with the English term and then the Filipino equivalent, this third approach is associated with reality, and it searches for the lexical expression of that reality. What counts, according to Enriquez, is the "identification of a concept as part of a posited classification, sequence, or fact, and the understanding of its significance in the context of a theory or viewpoint" (p. 269), rather than the search for a translation equivalent. One of the categorizations of concepts in Filipino under this approach is *surface assimilation*. This sub-approach is also known as *saling-paimbabaw,* where a word from a different language or culture

changes in visual form by adapting how it is spoken by the receptor but not in the meaning (Enriquez, 1985). For example, the word trachea is translated into *trakea*, by replacing the letter 'c' with 'k.' In the context of the letter 'c', be it known that it can either sound like 's' or 'k', hence there exists a slight variation with its corresponding translation. Further, there are six considerations that translators need to consider. To elucidate: (a) The frequency with which a term is used or its familiarity; (b) One category name suggesting the presence of developed literature compared to minimal literature; (c) A concept's relational and theoretical fertility; (d) Cultural and ethical acceptability considerations; (e) The concept's cultural matrix; and (f) Connotations and associations of the words for the concept.

5.2 The meaning-based translation

Translation is a cognitive effort in which one language's meaning is transposed into another form. It is the process of transforming linguistic components from one language to equivalents in another (Osman, 2017). There are numerous methods for translating a source language. The most critical aspect is to keep the meaning even if the receptor language form has been changed. Larson (1998) defines language as a complex system of relationships between *meaning* (semantics) and *form* (lexicon and grammar)" [*Emphasis ours*]. Each language has its own unique way of expressing its meaning. For instance, during translation, the same meaning might appear in different ways in the receptor language.

In translation, meaning must take precedence over lexicon and grammar. The meaning should be retained during the translation process. Thus, in this approach, the deep structure of the source language is translated, and not the surface structure of a word. For example, since the word atrium came from the Spanish word which means "cavity, entrance, or passage," then it is translated as *uka ng puso*, pertaining to a hole in the heart. Likewise, in the translation of inferior vena cava into *nasa ibabang ugat* and superior vena cava into *nakatataas na ugat* as the meaning implies.

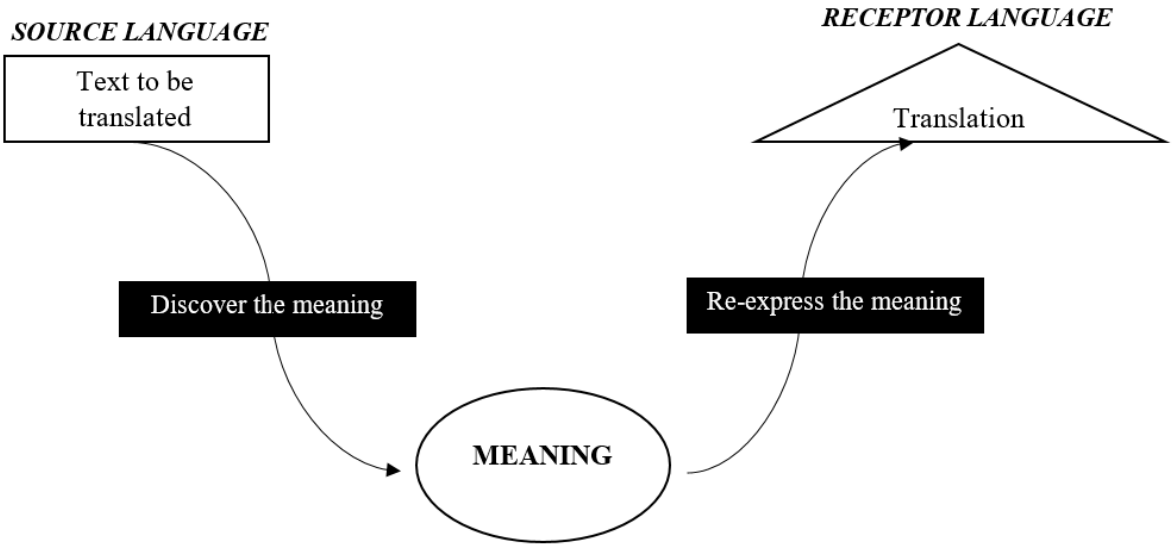

Figure 1. Meaning-based translation diagram (Adopted from Larson [1998, p. 3])

Figure 1 presents the diagram of meaning-based translation, wherein the meaning of the source language is the subject of the diagram. In this approach, translation consists of transferring the meaning of the source language into the receptor language (Larson, 1998). Through semantic structure, this technique transforms the form of the source language into the receptor language. In this paper, the source language is English and the receptor language is Filipino, wherein the word where the translation originates is the source language, while the one that needs to be changed is the receptor language.

5.3 Dynamic and functionalist approach

The exploration of how translation works using the categories used to analyze translations is also a feasible avenue. These are morphology, semantics, and process-related categories (Molina & Albir, 2002). Mechanisms of coherence, cohesiveness, and theme progression are described in these textual categories. However, there is an ensuing debate on the translation process among scholars. This falls under the conceptual and terminological arguments. There is even conflicting evidence on what to call the categories, thus Molina and Albir (2002), proposed different classifications of translation techniques. These include the literal translation, oblique translation, and Vinay and Darbelnet's (1977) translation procedures known as inversion.

Literal translation. Reicher (2019) posited that literal translation is a technique that centers on "[translation of] sentences or expressions word-for-word" (p. 33). Such a translation technique can only happen through the provision of an established equivalent of the input source (English) to the receptor language (Filipino). Since the English and Filipino languages have variations with respect to structural, lexical, and morphological equivalency, the best course of action, as Pure Fluent (2022) contends, is to provide a word-for-word equivalent of a given terminology. Cognizant to the dominant and informal practices in the Philippines, one of the most common strategies to verify the literal translation of a terminology is through the use of a *machine translator*.

In this study, the authors relied on the translations provided by the Gabby Dictionary, compiled by Luciano A. Gaboy (2022). It was chosen primarily for its comprehensiveness, as it provides pronunciation, phonemic, part of speech, meaning, and etymology in a single search. The authors labelled the words that they found in the said online machine translator as literal translation. In addition, the authors labelled the indigenous terms that have been used for many years in the Filipino vernacular as literal translation. Although there exist a variety of anatomical terms in the Filipino language, the provided local terminologies in the manuscript are typically used across the archipelago. They were counter-checked with native Filipino speakers with a deep command of Tagalog for accuracy.

Oblique translation. When literal translation or word-for-word translation is impossible, oblique translation is another promising alternative. Oblique translation includes the following: transposition, modulation, equivalence, and adaptation (Molina & Albir, 2002). *Transposition* is the change of word class, such as a verb becoming a noun or a noun becoming a preposition; while its variant, *cross-transposition* is the change of two signifiers. On the other hand, *modulation* is a shift in point of view. Modulation is a change in cognitive category, whereas transposition is a change in grammatical category. Moreover, *equivalence* illustrates why the same circumstance might be described using a completely different phrase, such as proverbs or idioms. Furthermore, *adaptation* is a change in the cultural milieu, such as *cycling* for the French, *cricket* for the Englishmen, and *baseball* for the Americans, to express the message in a different manner.

Inversion. Inverse translation is used in translation praxis when the translator moves words or phrases to elicit a more natural translation or reading (Garcia, n.d.). To be specific, this involves switching or moving a word or phrase in a sentence or paragraph to make it read more naturally in the receptor language (Coronel-Molina & Samuelson, 2016). Thus, nasal cavity is translated as *kabidad na pangilong*, with the addition of linking word such as *na* in the phrase. In the utilization of this approach, it is important to note how it will sound naturally in the receptor language. In fact, the importance of adapting and studying in-depth the phonemics, morphological, and syntactical analysis of both the input source of language and the receptor language should be done by the translator.

6. The anthology of multi-organ system Filipino terminologies

There are various organ systems highlighted in this paper. These include (1) sensory organs (eye, ear, nose, and mouth); (2) nervous system (inner and outer); (3) cardiovascular system; (4) circulatory system; (5) pulmonary system; (6) skeletal system; (7) accessory structures of the skeletal and muscular system; (8) gastrointestinal system; (9) genitourinary system; (10) reproductive system (male and female); (11) endocrine system; and (12) immune system. The structures and terms were translated using the different approaches cited above.

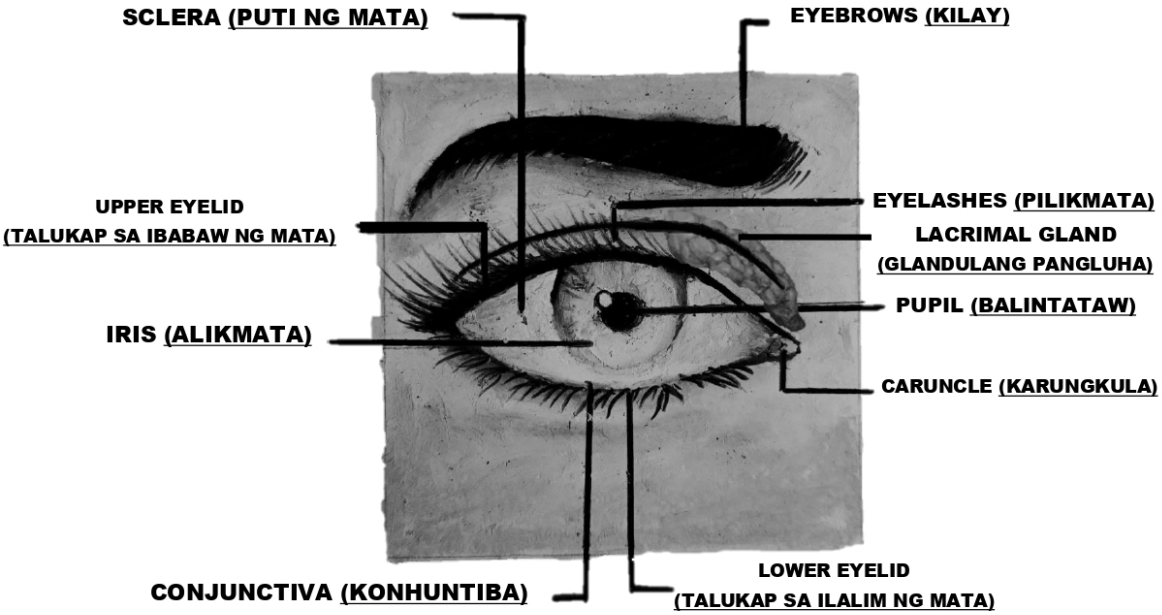

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Figure 2. Sensory Organ (Eye)

Figure 2 shows the anatomical structure of the eye with its respective Filipino terminologies. Based on the given illustration, sclera *(puti ng mata),* eyebrows *(kilay),* eyelashes *(pilikmata),* iris *(alikmata),* pupil (*balintataw*) were translated using the literal translation approach (indigenous/local use). This means that the terminologies are translated based on the common Filipino terms that are used to depict such words. These Filipino terminologies were verified using

a machine translator that directly converted the English word into Filipino language. Whereas caruncle *(karungkula)* and conjunctiva *(konhuntiba)* were translated from Spanish through the decision-procedure approach. In the study of Del Rosario (1981, as cited by Bautista, 1988), this approach is used when a term does not have a definite etymology and is not related to other names. Hence, they borrow the word from other languages if the said English term has no native equivalent in its own language. On the other hand, some parts were translated using an inversion approach, such as the upper eyelid *(talukap sa ibabaw ng mata)* and the lower eyelid *(talukap sa ilalim ng mata).* This approach is used when two English words were translated inversely in Filipino. Hence, from the given example, which is the upper eyelid, the Filipino of upper is *ibabaw* while eyelid is *talukap.* However, it cannot be translated to *ibabaw talukap* because it is inappropriate. That is why it is translated as '*talukap sa ibabaw ng mata*' through inversion approach. The linking words *sa* and *ng* are added as linking words to make the term more understandable. Likewise, lacrimal gland *(glandulang pangluha)* was also translated using the inversion approach and the meaning-based approach because lacrimal in Filipino is *hinggil sa luha* and gland is *glandula,* so using the inversion approach, it will be translated inversely and dependent on its meaning or function, which turns to *glandulang pangluha.*

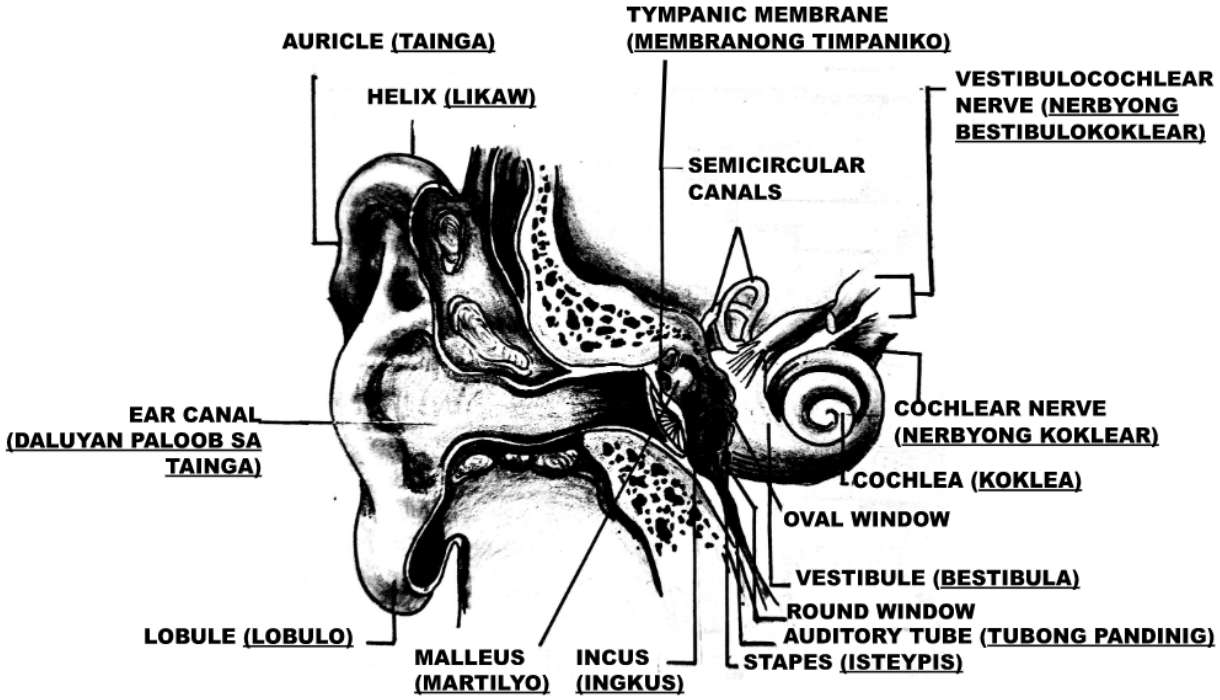

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Figure 3. Sensory Organ (Ear)

Figure 3 unveils the inner ear structures together with the corresponding Filipino translation. Structures such as the auricle *(tainga)*, helix *(likaw)*, malleus *(martilyo)*, vestibule *(bestibula),* and lobule *(lobulo)* have literal translations (indigenous/local use), as verified by the machine translator. Whereas tympanic membrane *(membranong timpaniko)*, vestibulocochlear nerve *(nerbyong bestibulokoklear)*, cochlear nerve *(nerbyong koklear)*, and auditory tube *(tubong pandinig)* were translated using the inversion approach. This is when the arrangement of words in

the translated terminology is changed and inverted from the original or English term. The first word from the original term is arranged as the second word in the translated term, and vice versa. Tympanic *(timpaniko),* vestibulocochlear *(bestibulokoklear),* and cochlear *(koklear)* were translated using the decision-procedure approach and discipline-driven approach. On the other hand, the ear canal *(daluyan paloob sa tainga)* was translated through a meaning-based approach. As for the incus *(ingkus)*, cochlea *(koklea),* and stapes *(isteypis)*, they were translated based on the discipline-driven approach, wherein the terms are translated based on how they were pronounced. There are also words that are not translated, like semicircular canals, oval window, and round window due to the absence of literal translations that can cause misinterpretations.

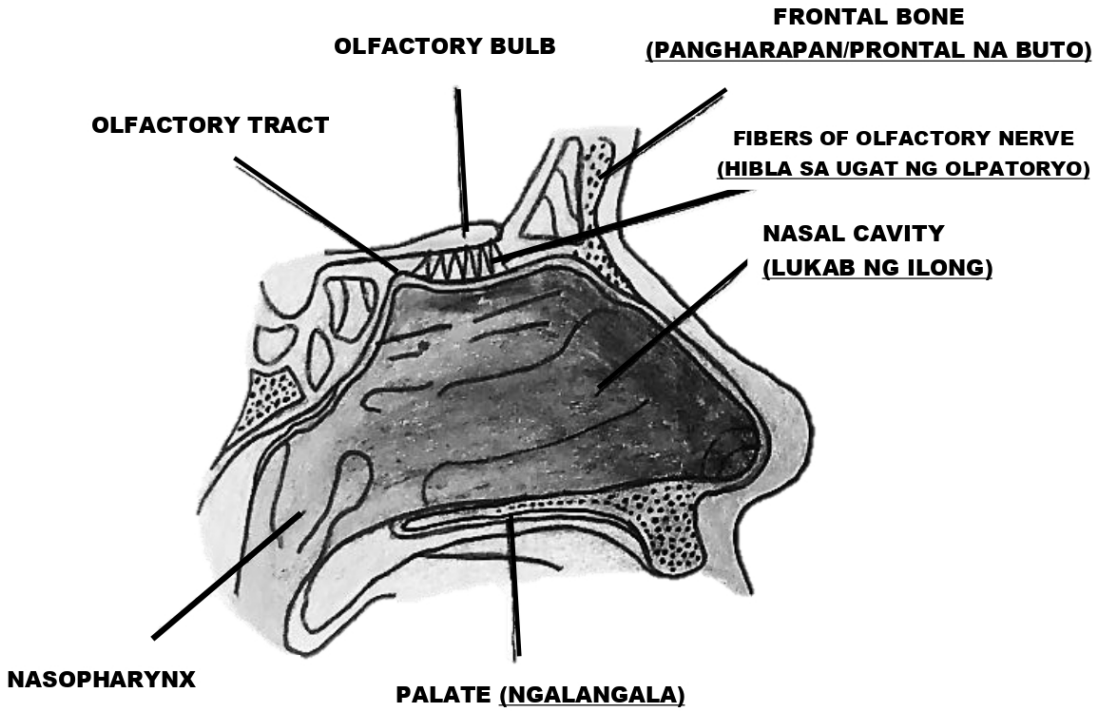

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Figure 4. Sensory Organ (Nose)

Figure 4 illustrates the anatomical structure of the nose with its respective Filipino terminologies. The term frontal bone *(pangharapan/prontal na buto)* was translated using the decision-procedure approach. Meanwhile, terms like fibers of the olfactory nerve *(hibla sa ugat ng olpatoryo)* and nasal cavity *(lukab ng ilong)* were translated using the meaning-based approach. It simply means that the translated word depends on the function of the said organ. Palate *(ngalangala)* was translated using a literal translation approach (indigenous/local use). Using this approach entails that the English term has an equivalent Filipino term in the local setting. Lastly, terms like nasopharynx, olfactory tract, and olfactory bulb have no literal translations to depict these words even after searching several resources.

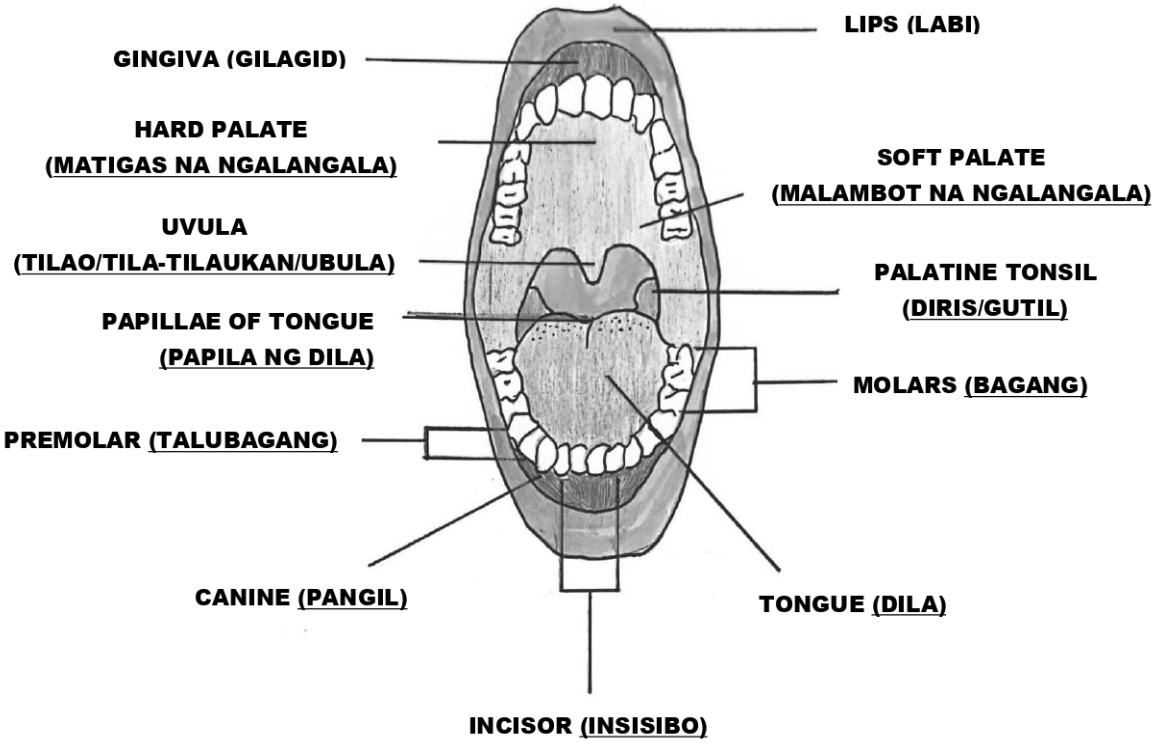

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Figure 5. Sensory Organ (Mouth)

Figure 5 conveys the anatomical structure of the mouth. Based on figure 5 above, terms like lips *(labi),* molars *(bagang),* tongue *(dila),* incisor *(insisibo),* canine *(pangil),* premolar *(talubagang)*, palatine tonsil *(diris/gutil)*, and gingiva *(gilagid)* were translated using the literal translation approach (indigenous/local use). These are words that are commonly used in the Filipino vernacular. Whereas terminologies like uvula (*tilao/tila-tilaukan/ubula*), soft palate *(malambot na ngalangala),* papillae of tongue *(papila ng dila),* and hard palate *(matigas na ngalangala)* were translated with a machine translator.

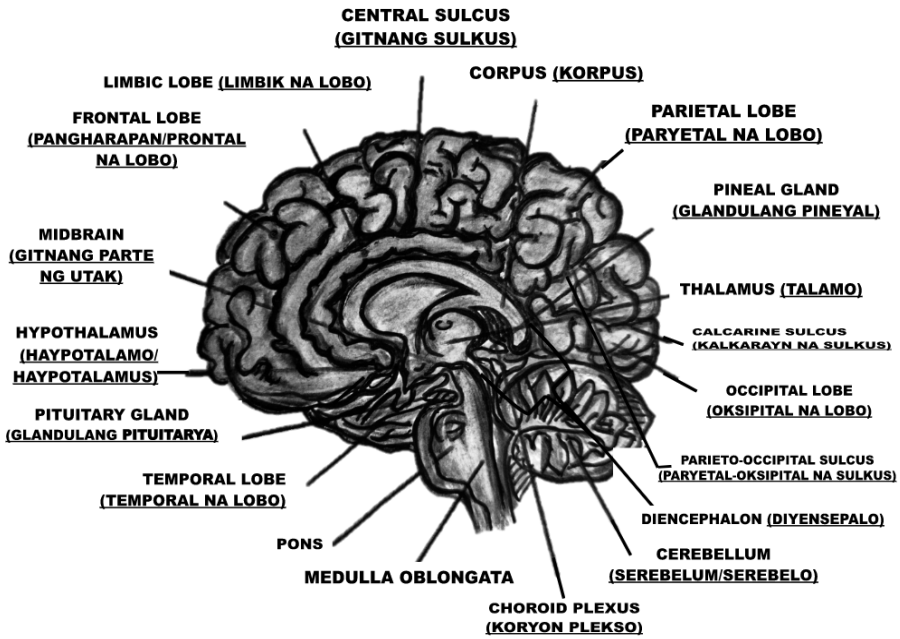

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Figure 6A. Nervous System (Inner)

Figure 6A denotes the inner structure of the human brain with its corresponding anatomical Filipino terminologies. The decision-procedure, literal translation, and discipline-driven approaches were used in this system. Corpus (*korpus*), hypothalamus (*haypotalamo/haypotalamus*), thalamus (*talamo*), and cerebellum (*serebelum/serebelo*) were translated to Filipino using the Spanish language as an anchor. It is under the decision-procedure approach where there are certain letters that need to be changed to depict the Filipino terminologies. In this case, letter 'c' was changed to 'k', 'u' was changed to 'o', and other letters thereafter, like 'a', to get the Filipino translation. Another example is the hypothalamus, which became *haypotalamo*, where letter 'h' and 's' were deleted but letter 'a' was added. In connection with this, diencephalon (*diyensepalo*) was translated using the literal Spanish translation. Also, when using this kind of language, it is necessary to delete and add to get the right Spanish term because it depends on its language and meaning. This statement is supported by Ivannovation Language Management (2020), which stated that English to Spanish translation does not only involve working with the words themselves but also on their language and meaning. Whereas terms like central sulcus (*gitnang sulkus*), parietal lobe (*paryetal na lobo*), calcarine sulcus (*kalkarayn na sulkus*), occipital lobe (*oksipital na lobo*), parieto-occipital sulcus (*paryetal-oksipital na sulkus*), choroid plexus (*koryon plekso*), temporal lobe (*temporal na lobo*), midbrain (*gitnang parte ng utak*), and limbic lobe (*limbik na lobo*) were translated using the machine translation. Likewise, frontal lobe (*pangharapan/prontal na lobo*) was also translated using the decision-procedure approach because it includes *pang-* in the word to depict its Filipino terminology. On the other hand, terms like pineal gland (*glandulang pineyal*) and pituitary gland (*glandulang pituitarya*) were translated using an inversion approach and surface assimilation under the discipline-driven approach. Lastly, pons and medulla oblongata have no equivalent Filipino terms even after consulting several resources.

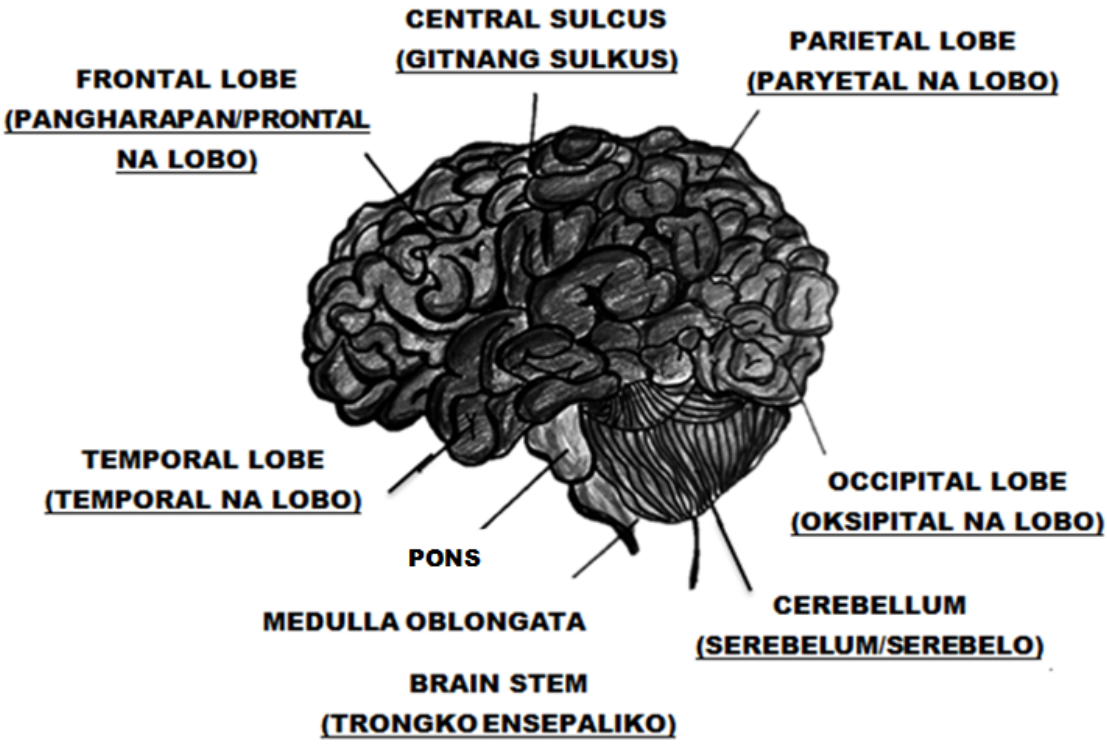

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Figure 6B. Nervous System (Outer)

Figure 6B depicts the outer structure of the human brain with its anatomical and Filipino terminologies. From the illustration, terms like central sulcus *(gitnang sulkus),* parietal lobe *(paryetal na lobo),* occipital lobe *(oksipital na lobo),* and temporal lobe *(temporal na lobo)* were translated using the machine translation and decision-procedure approach. The frontal lobe *(pangharapan/prontal na lobo)* was treated with a decision-procedure approach also because it includes *pang-* in the word to depict its Filipino terminology. Likewise, cerebellum *(serebelum/serebelo)* has Spanish traces, hence it was translated under the decision-procedure approach. So, when using this kind of approach, there are certain letters that you need to delete and add to get the right Spanish term because it depends on its language and meaning. As an example, in cerebellum, the letter 'c' became 's' and adds letter 'o' in the end of the word and letter 'l' became single. In connection with this, the brain stem *(trongko ensepaliko)* was translated using the decision-procedure approach. On the other hand, medulla oblongata has no equivalent Filipino term even after checking various materials.

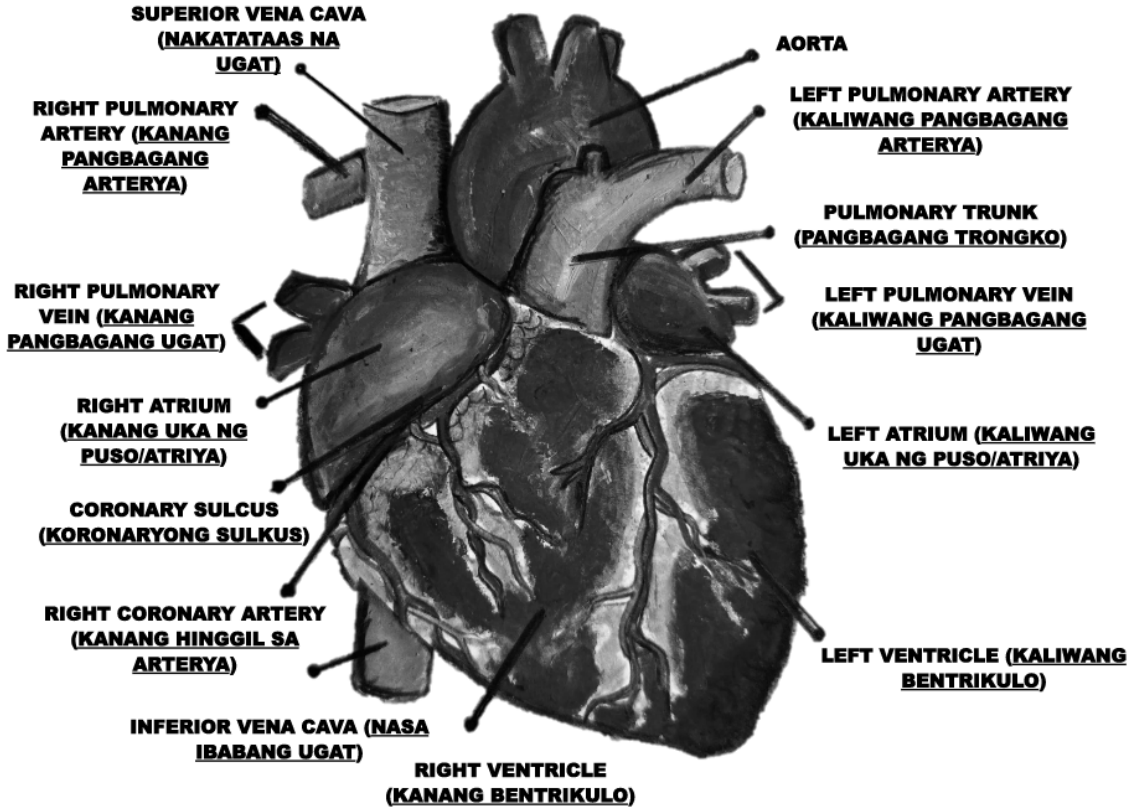

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Figure 7. Cardiovascular System

Figure 7 highlights the anatomical structures in the cardiovascular system and their appropriate Filipino terminologies. Based on figure 7 above, left pulmonary artery (*kaliwang pangbagang arterya*), pulmonary trunk (*pangbagang trongko*), left pulmonary vein (*kaliwang pangbagang ugat*), right pulmonary artery (*kanang pangbagang arterya*), and right pulmonary vein (*kanang pangbagang ugat*) were translated into Filipino based on literal translation (indigenous/local use) and decision-procedure approach. Otanes (1977) and Santiago (1981) contend that this approach employs a field-tested algorithm to select the most likely acceptable forms for the technical lexicon from a set of other forms. Hence, in this case, for an English technical term, it is suggested to determine a suitable Filipino term wherein right can be translated into *kanan* and left can be translated into *kaliwa.* However, the word pulmonary does not fit into this alternative, but rather employs additional source through a combination of affixes *pang*- in addition to the Spanish equivalent which means lung, thus pulmonary is translated into *pangbaga*. On the other hand, left atrium (*kaliwang uka ng puso/atriya*), right atrium *(kanang uka ng puso/atriya*), left ventricle (*kaliwang bentrikulo*), right ventricle (*kanang bentrikulo*), right coronary artery (*kanang hinggil sa arterya*), coronary sulcus (*koronaryong sulkus*), superior vena cava (*nakatataas na ugat*) and inferior vena cava (*nasa ibabang ugat*) were translated into Filipino through the utilization of English with respelling. In this alternative, the origin should be easily retrieved from the receptor language. Thus, the word ventricle is translated into *bentrikulo,* artery is translated into *arterya,* and coronary is translated into *koronaryo*. However, some of these words

were translated through meaning-based approach. In this approach, the source translation occurs through accurately conveying the meaning, then re-expressing the meaning through the receptor language (Larson, 1998). Since the word atrium came from the Spanish word which means "cavity, entrance or passage", it is then translated as *uka ng puso* pertaining to a hole in the heart. In translating inferior vena cava into *nasa ibabang ugat* and superior vena cava into *nakatataas na ugat,* meaning-based approach can also be utilized.

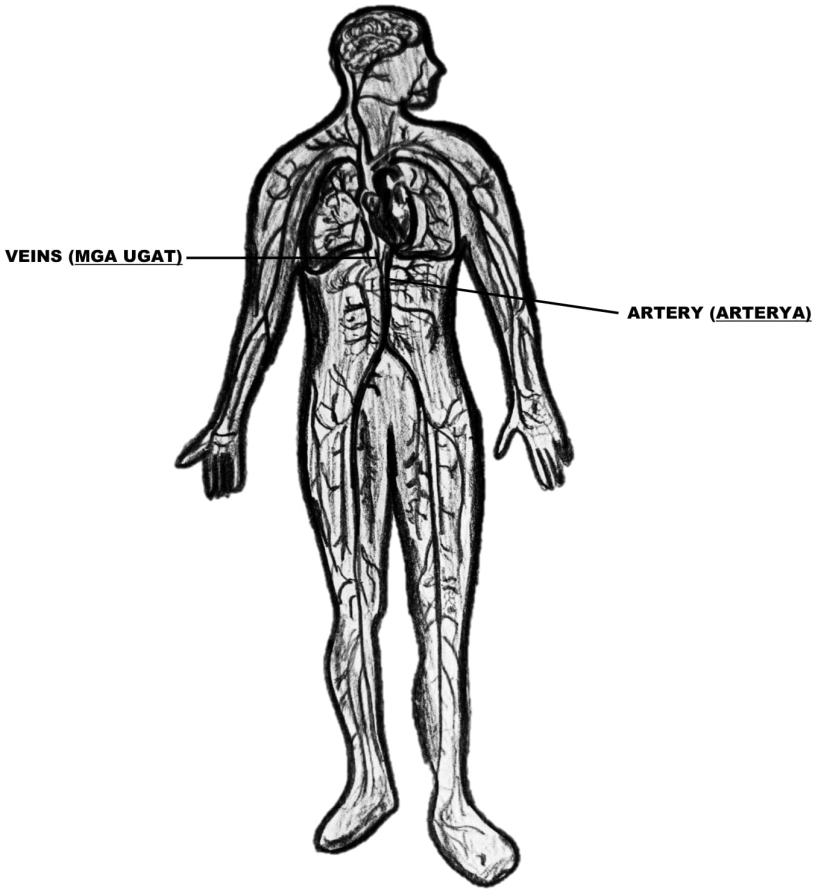

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Figure 8. Circulatory System

Figure 8 accentuates the anatomical structures in the circulatory system and its Filipino translation. Veins (*mga ugat*) and artery (*arterya*) were respectively translated into Filipino terminology through literal translation (indigenous/local use) and respelling of the input source of language, which is Spanish. Literal translation is the word-for-word translation; thus, the word veins is translated into *ugat* as it is typically appreciated in the Filipino language. However, because the word denotes plural form, there is an addition of *mga* in Filipino morphology where it should be placed before the noun to make it plural. Thus, the word *veins* is translated into *mga ugat* and *ugat* if in singular form. Conversely, the term *arterya* involves the respelling of the Spanish term *arteria* through the decision-procedure approach.

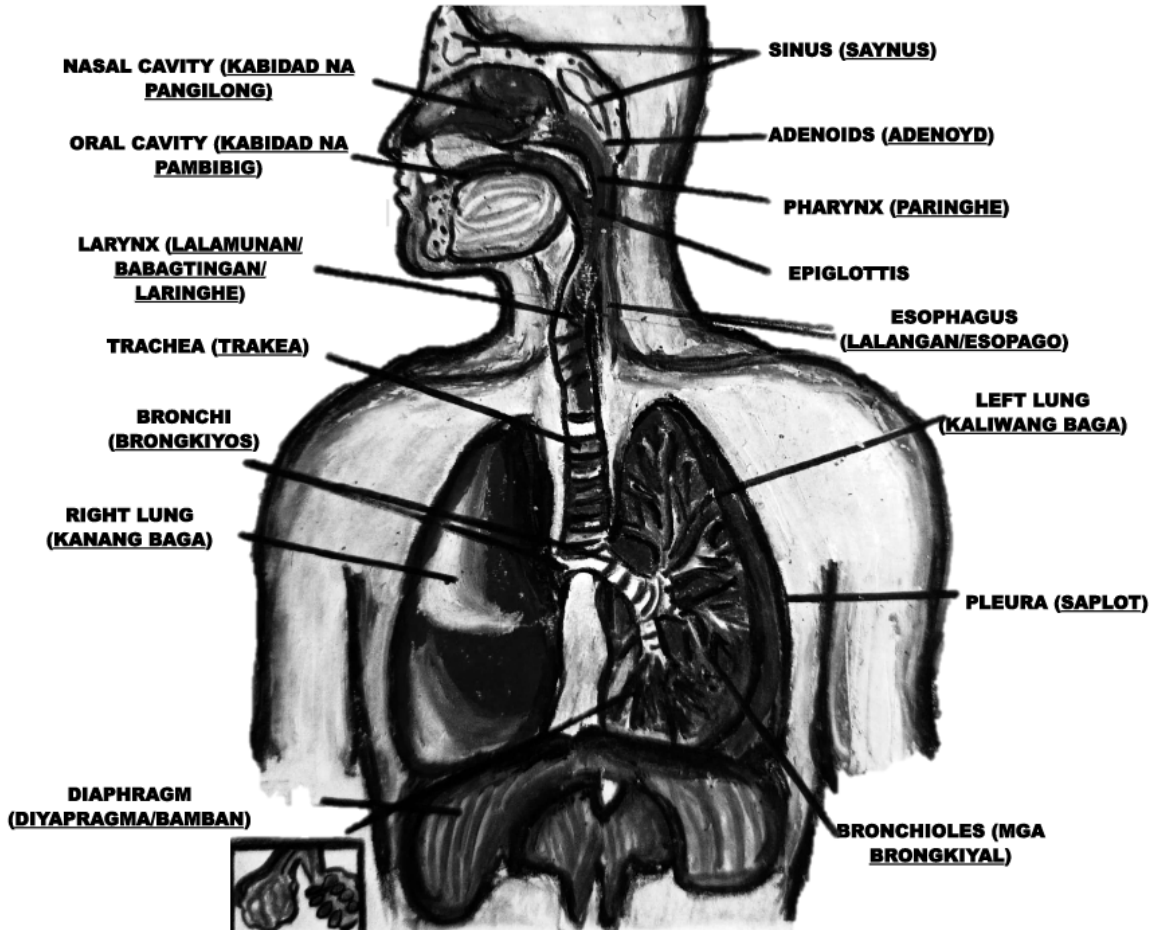

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Figure 9. Pulmonary/Respiratory System

Figure 9 typifies the anatomical structure of the pulmonary/respiratory system and its appropriate Filipino terminologies. As shown, the larynx (*lalamunan/babagtingan*), right lung (*kanang baga*) and, left lung (*kaliwang baga*) were translated into Filipino through literal translation (indigenous/local use). Lung was translated as *baga* and differentiators like right and left into *kanan* and *kaliwa* were included, respectively. The surface assimilation method was used to translate the trachea (*trakea*), sinus (*saynus*), and adenoids (*adenoyd*). This approach is also known as *saling-paimbabaw* where a word from a different language or culture changes in visual form by adapting how it is spoken by the receptor but not in the meaning (Enriquez, 1985). Thus, the word trachea is translated into *trakea*, while sinus and adenoids are translated into *saynus* and *adenoid*, respectively. Accordingly, in Filipino phonics, instead of spelling it as 'c', it is frequently spelled as 'k' (thus, trachea is translated into *trakea)*. Likewise in sinus, which was translated as *saynus*, where the letter 'i' spelled as 'ay' because of how it is pronounced. However, the nasal cavity (*kabidad na pangilong*) and the oral cavity (*kabidad na pambibig*) were translated using the inversion method. Inverse translation is used in translation studies to describe the act of translating from one's mother tongue into another working language (Garcia, n.d.). This involves switching or moving a word or phrase in a sentence or paragraph to make it read more naturally in the receptor

language (Coronel-Molina & Samuelson, 2016). Thus, nasal cavity is translated as *kabidad na pangilong*, with the addition of linking word such as *na* in the phrase. Moreover, larynx *(laringhe)* and pharynx *(paringhe)* were translated into Filipino through the decision-procedure approach. Since words lack unambiguous etymologies and are isolated or unrelated to other words, they are frequently borrowed from other languages if no native equivalent exists in one's own. Thus, since these words have no equivalent name in the receptor language, pharynx and larynx when appreciated in English can be translated into *paringhe* (pharynx) and *laringhe* (larynx) in Filipino. Furthermore, pleura *(saplot)* was translated through its conveying function. Thus, pleura was translated into *saplot* since its function is to cover the lungs.

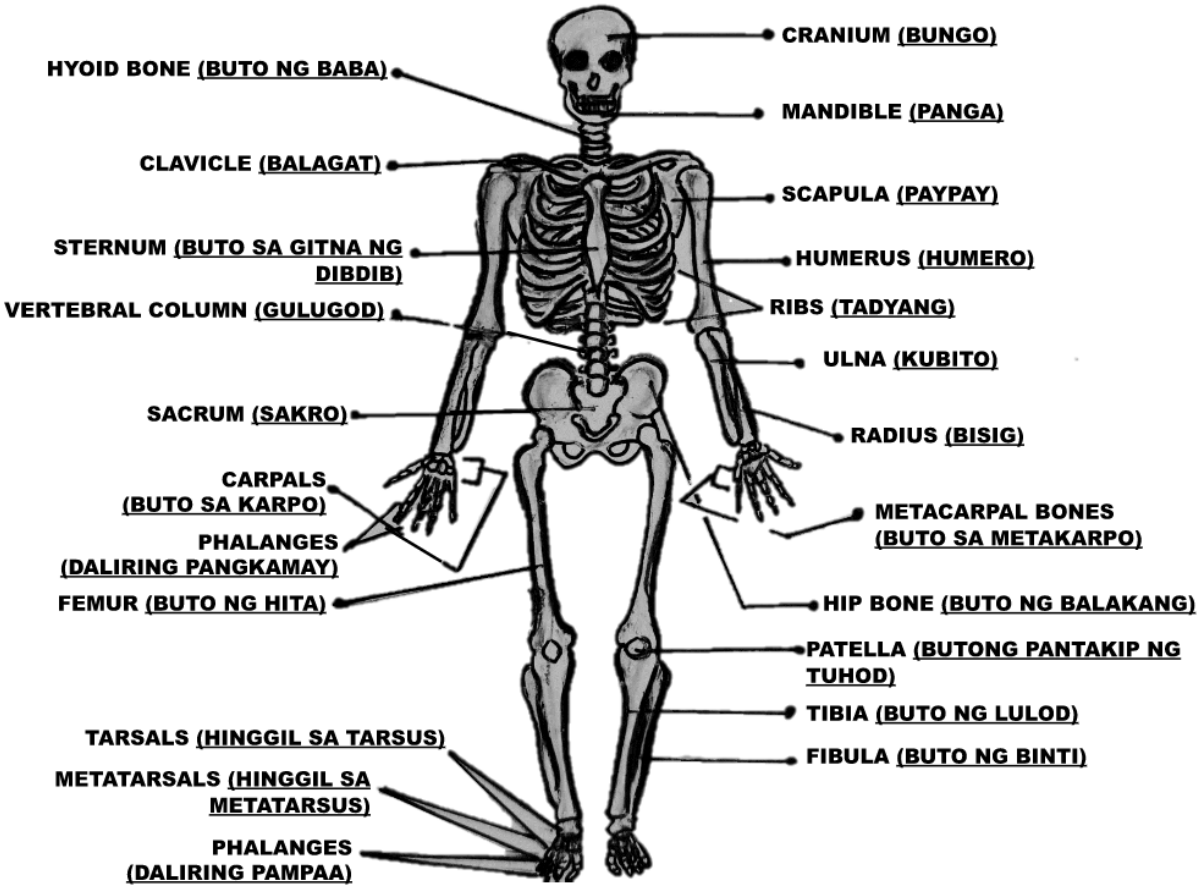

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Figure 10. Skeletal System

Figure 10 portrays the anatomical structures of the skeletal system in a frontal/anterior view. In this system, the translation approaches used were literal translation, decision-procedure approach, inversion approach, meaning-based approach, and discipline-driven approach. The structures that were translated through a literal translation (indigenous/local use) include the cranium *(bungo)*, mandible *(panga)*, scapula (*paypay)*, ribs *(tadyang)*, ulna *(kubito)*, radius *(bisig)*, vertebral column *(gulugod)*, and clavicle *(balagat)*. These translated words were verified by utilizing the machine translator. Whereas the words that were translated using the inversion approach are hyoid bone *(buto ng baba)* and hip bone *(buto ng balakang),* and metacarpal bones

(buto sa metakarpo). There were also terms that were translated based on their meaning, which falls under the meaning-based approach, such as sternum *(buto sa gitna ng dibdib)*, phalanges *(daliring pangkamay/pampaa)*, femur *(buto ng hita)*, patella *(butong pantakip ng tuhod)*, carpals *(buto sa karpo)*, tibia *(buto ng lulod)* and fibula *(buto ng binti)*. On the other hand, there were terminologies that were translated based on a discipline-driven approach, and those were metacarpal *(metakarpo)* and carpal *(karpo)* as they were adopted from Spanish translation. They can also be viewed under the decision-procedure approach as they entailed the conduct of respelling.

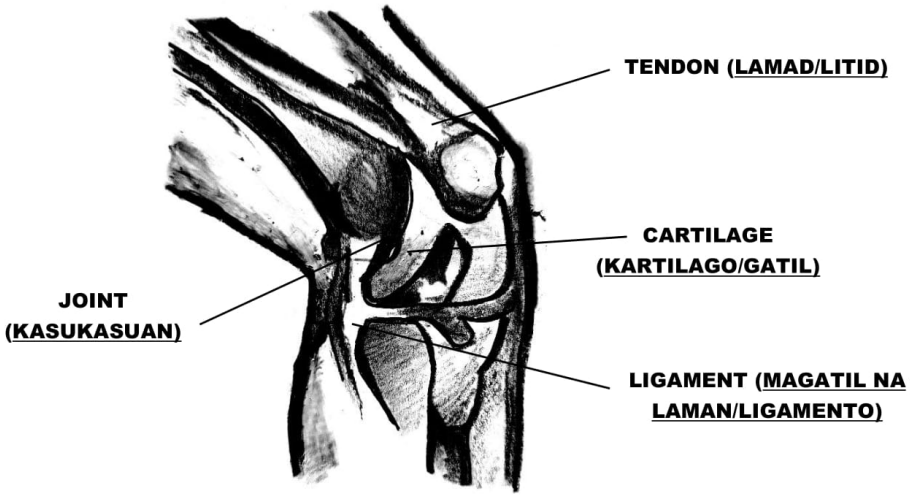

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Figure 11. Accessory Structures of the Muscular and Skeletal System

Figure 11 displays the accessory structure of the muscular and skeletal systems and their Filipino terminologies. Tendon (*lamad/litid*) and joint (*kasukasuan*) were translated through its literal translation (indigenous/local use). These words are verified with the utilization of machine translation. However, other words were not suitable in this approach, thus terminologies such as cartilage *(kartilago)* and ligament *(ligamento)* were translated through discipline-driven and decision-procedure approaches. This approach allows the words frequently taken from other languages and the respelling of this input source language is based on their pronunciation (Bautista, 1988). Thus, cartilage is translated into *kartilago*, as it comes from the Latin word *cartilago* with fewer modification, such as changing the letter 'c' to 'k' to make it sound natural; meanwhile ligament is translated into *ligamento* with the addition of a vowel at the end. Moreover, some of the terms can also be translated through a meaning-based approach, whereby the cartilage was translated as *magatil na laman*, which specifically describes how cartilage looks as connective tissue.

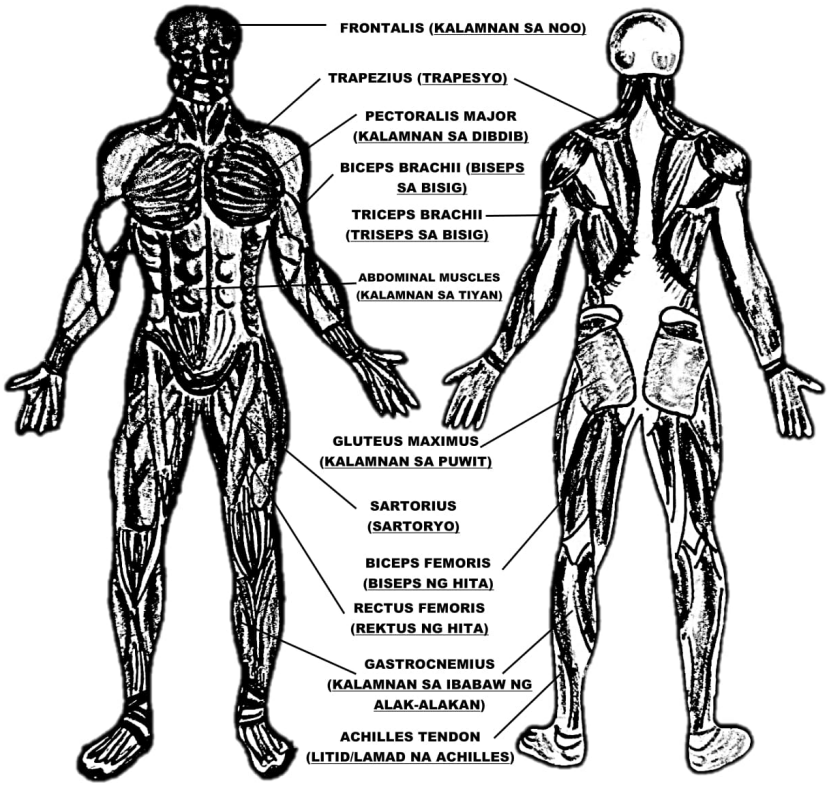

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Figure 12. Muscular System

Figure 12 features the anatomical structures in the muscular system and their appropriate Filipino terminologies. Based on this figure, frontalis (*kalamnan sa noo*), pectoralis major (*kalamnan sa dibdib*), abdominal muscles (*kalamnan sa tiyan*), gluteus maximus (*kalamnan sa puwit*), and gastrocnemius (*kalamnan sa ibabaw ng alak-alakan*) were translated through a meaning-based approach. In this type of approach, the source translation occurs by accurately delivering the meaning, and then the meaning is re-expressed through the receptor language (Larson, 1998). Thus, frontalis was translated into *kalamannan sa noo* because it depicts the muscle in the forehead, likewise in the meaning behind pectoralis major (*kalamannan sa dibdib*) pertaining to chest wall; abdominal muscle (*kalamnan sa tiyan*) referring to abdomen; gluteus maximus (*kalamnan sa puwit*) suggesting buttocks; and gastrocnemius (*kalamnan sa ibabaw ng alak-alakan*) indicating the calf of the leg in which each word mostly retains its value of semantic content. On the other hand, biceps brachii (*biseps sa bisig*), triceps brachii (*triseps sa bisig*), rectus femoris (*rektus ng hita*), and biceps femoris (*biseps sa hita*) were translated through conglomerating approaches such as the decision-procedure approach and meaning-based translation. In this type of approach, Spanish with respelling is appropriate, thus biceps was translated into *biseps* with the switching of letter 'c' to 's.' However, this alternative does not suit the words brachii (*bisig*) and femoris (*hita*). Thus, they were translated by understanding the meaning behind their word etymology and translating them into Filipino terminologies. Then, these two sources were combined with the addition of a linker in between these words. Moreover, trapezius (*trapesyo*) and sartorius (*sartoryo*) were translated through a decision-based approach. As trapezius' etymology came from the Spanish word *trapecio*, hence it is translated as *trapesyo.*

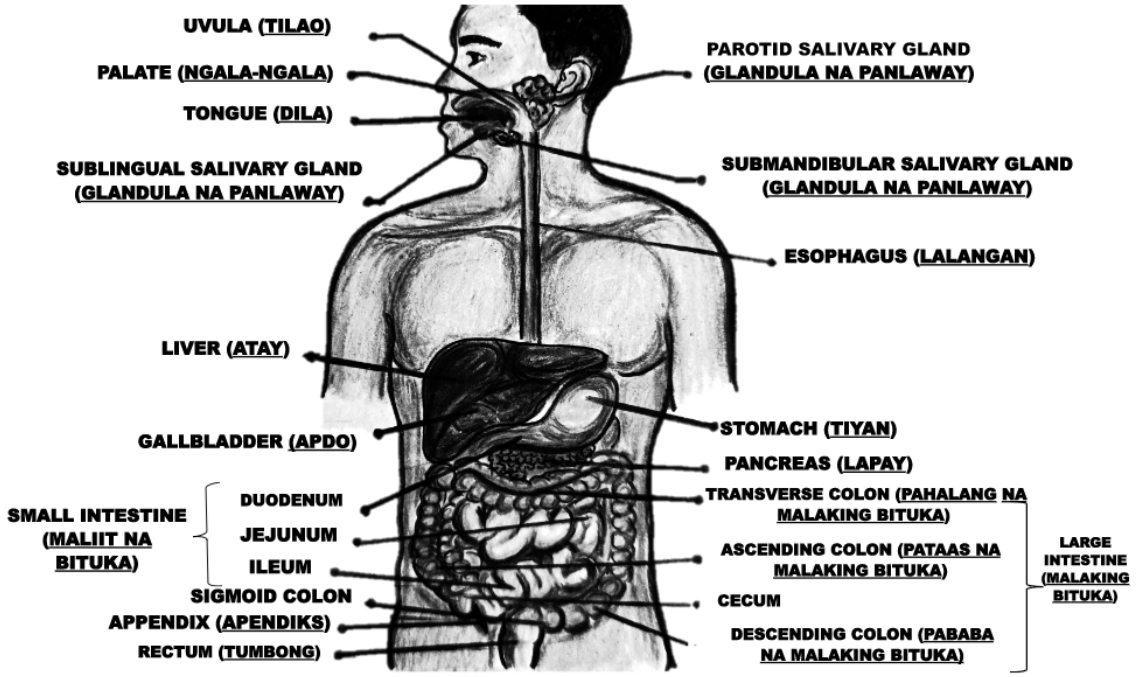

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Figure 13. Gastrointestinal/Digestive System

Figure 13 unravels the anatomical structures in the gastrointestinal/digestive system and its appropriate Filipino terminologies. Based on this figure, the uvula (*tilao*), palate (*ngala-ngala*), tongue (*dila*), esophagus (*lalangan*), liver (*atay*), gallbladder (*apdo*), pancreas (*lapay*), stomach (*tiyan*), and rectum (*tumbong*) were translated through literal translation (indigenous/local use) with the aid of a machine translator. On the other hand, the small intestines (*maliit na bituka*), large intestine (*malaking bituka*), transverse colon (*pahalang na malaking bituka*), ascending colon (*pataas na malaking bituka*), and descending colon (*pababa na malaking bituka*) were translated through literal translation (indigenous/local use). Thus, intestine is translated into *bituka*, whereas large and small are translated into *malaki* and *maliit,* respectively. A linking word was added in between the adjective and the noun. Moreover, sublingual salivary gland (*glandula na panglaway*), parotid sublingual salivary gland (*glandula na panglaway*), and submandibular sublingual salivary gland (*glandula na panglaway*) were translated through the inverse method. Accordingly, inverse translation is used to describe the process of translating from one's mother tongue into another working language (Garcia, n.d.). This is when a word or phrase in a sentence or paragraph is switched or moved to make it read more naturally in the receptor language (Coronel-Molina & Samuelson, 2016). Thus, sublingual salivary gland, parotid sublingual salivary gland, and submandibular sublingual salivary gland were translated into *glandula na panglaway,* wherein there was a switching of words, with the addition of linking word *na.* Due to its inherent meaning and function, it has the same translation in all three (3) types of salivary gland, which justifies the meaning-based translation approach. In addition, the appendix is translated into '*apendiks*' through a decision-procedure approach. This method allows for the use of respelling, in which the letter 'x' is replaced by 'eks' in phonics.

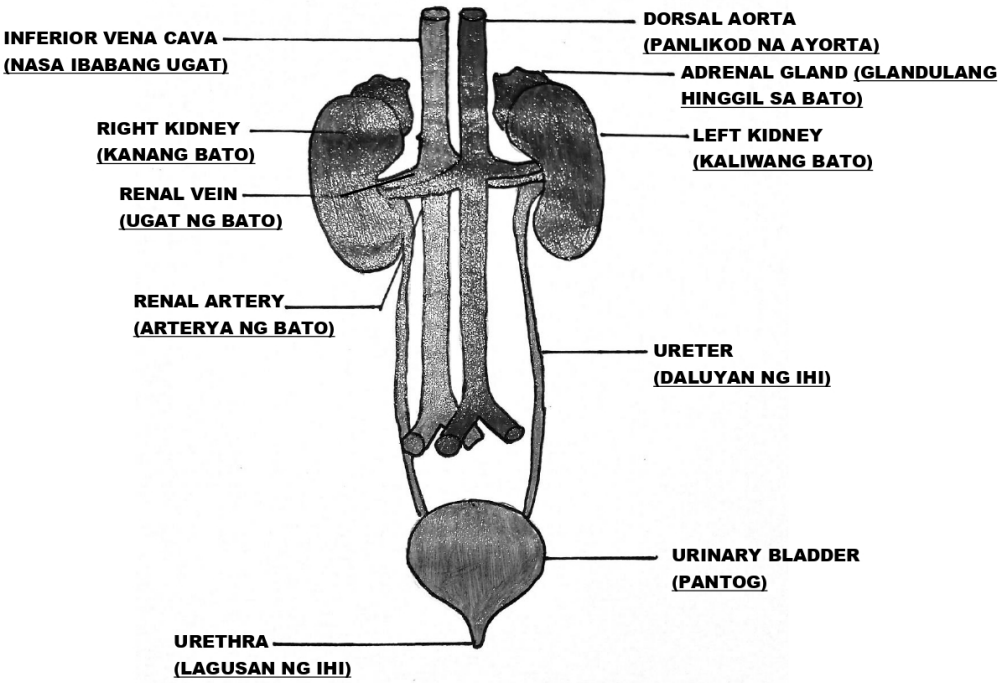

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Figure 14. Genitourinary/Excretory System

Figure 14 delineates the frontal view of the genitourinary/excretory system together with its labelled structure and Filipino translation. The translation approaches used in this system were literal translation, meaning-based approach, decision-procedure approach, discipline-driven approach, and inversion translation. The anatomical structures that were translated via literal translation (indigenous/local use) include the urinary bladder *(pantog)* and kidney *(bato).* Literal translations were also applied to the right kidney *(kanang bato)* and left kidney *(kaliwang bato)*. Whereas urethra *(lagusan ng ihi)*, ureter *(daluyan ng ihi),* and inferior vena cava *(nasa ibabang ugat)* were translated based on the meaning-based approach. As for the dorsal aorta *(panlikod na ayorta)*, adrenal gland *(glandulang hinggil sa bato)*, renal vein *(ugat ng bato)*, and renal artery *(arterya ng bato)*, these terms were translated through an inversion approach. On the other hand, the discipline-driven and decision-procedure approaches include the term artery *(arterya).*

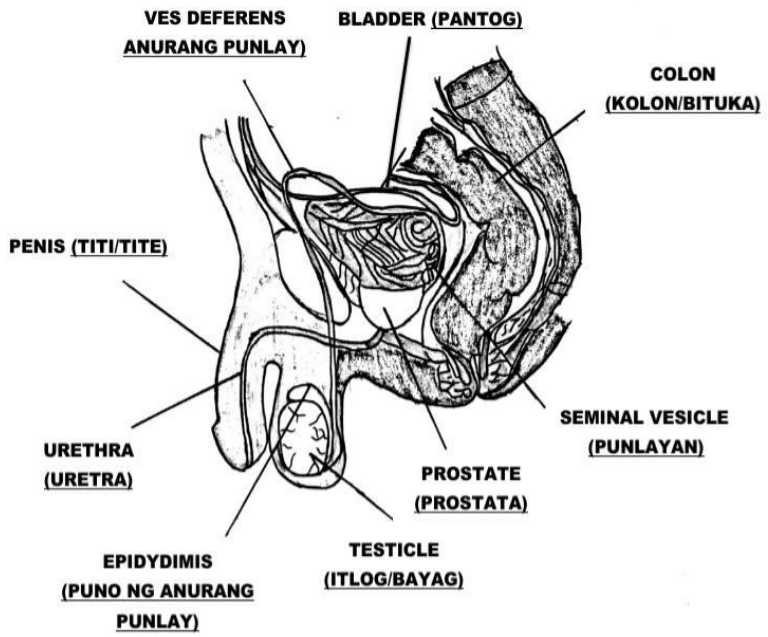

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Figure 15. Reproductive System (Male) [Internal Genitalia]

Figure 15 discloses the anatomical structure of the male reproductive system (internal genitalia) and its respective Filipino terminologies. Based on the illustration above, terms like bladder *(pantog),* colon *(kolon/bituka), testicle (itlog/bayag),* and penis *(titi/tite)* were translated using a literal translation approach (indigenous/local use). Likewise, terms like seminal vesicle (*punlayan)*, epidydimis *(puno ng anurang punlay),* and vas deferens *(anurang punlay)* were also under the literal translation approach but verified through a machine translator. On the other hand, urethra *(uretra)* and prostate *(prostata)* both originated from the Spanish language and were translated using the decision-procedure approach. This means that there are certain letters that warrant deletion and addition to get the right Filipino terminology. An example would be prostate, which was translated to '*prostate*' where 'e' was changed to 'a.'

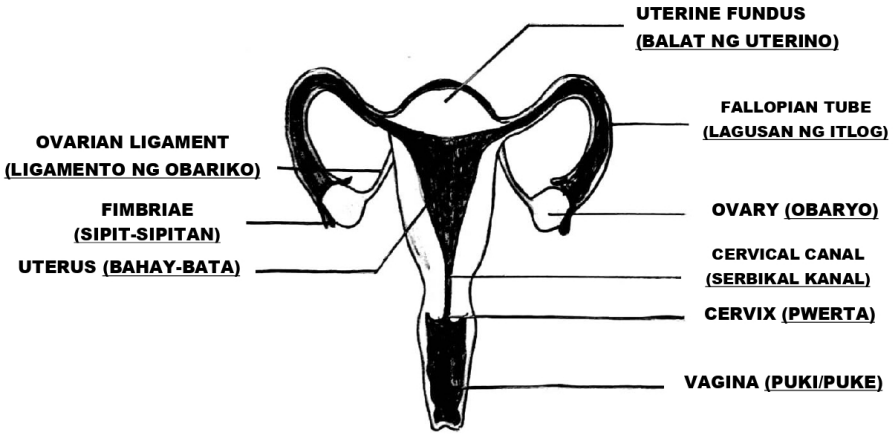

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Figure 16. Reproductive System (Female) [Internal Genitalia]

Figure 16 showcases the anatomical structure of the female reproductive system (internal genitalia) and its respective Filipino terminologies. From the given figure above, terms like uterine fundus *(balat ng uterino)* and ovarian ligament *(ligamento ng obariko)* were translated through inversion and decision-procedure approaches. The inversion approach was utilized because two words were translated inversely to get the right Filipino terminology, while the decision-procedure approach was used because words like *uterino* and *ligamento* were from the Spanish language. Whereas terms like ovary *(obaryo;* can be appreciated under the decision-procedure approach as well*),* cervix *(pwerta),* vagina (*puki/puke),* and uterus *(bahay-bata),* fimbriae *(sipit-sipitan)* were under the literal translation approach (indigenous/local use). Then, fallopian tube (*lagusan ng itlog)* was translated using the meaning-based approach. To explicate, the translated word depends on the function of the organ. An example is the fallopian tube. It is where the egg cell is being fertilized and transported, hence it is translated as *lagusan ng itlog.* Lastly, the cervical canal *(serbikal kanal)* was translated using literal translation. Meaning, it was translated by just changing some letters like 'c' to 'k' or 's' or the literal spelling when transposing an English word to its literal Filipino term.

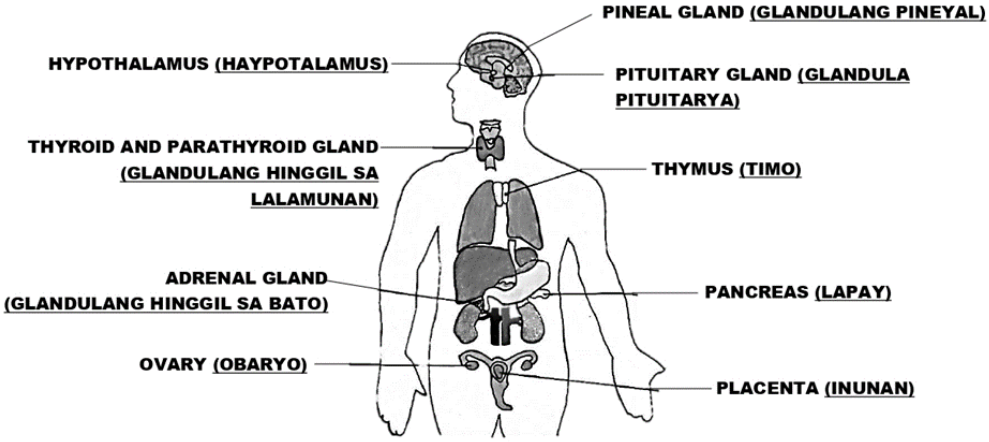

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Figure 17. Endocrine System

Figure 17 indicates the anatomical structures in the endocrine system. The approaches that were used to translate the anatomical terminologies were the decision-procedure approach, discipline-driven approach, literal translation, and inversion approach. The terminologies that have literal translations (indigenous/local use) are pancreas *(lapay),* placenta *(inunan),* and ovary *(obaryo*; can be appreciated under the decision-procedure approach as well*).* These translations were verified using machine translation. Whereas terms like pineal gland (*glandulang pineyal*) and adrenal gland (*glandulang hinggil sa bato*) were translated using the inversion method, which alters and inverts the word arrangement in the translated terminology from the original term. The first word from the original term is arranged as the second word in the translated term. It can also be noticed that the word pineal is translated into *pineyal* through surface assimilation via a discipline-driven approach because it involves the reinforcement of the words based on how they were read. Meanwhile, adrenal is translated into *higgil sa bato* using meaning-based approach.

Likewise, hypothalamus *(haypotalamus)* was also translated using the discipline-driven approach. On the other hand, thymus is translated through a decision-procedure approach because thymus has no literal translation in Filipino. Hence, the researchers used Spanish translation of thymus instead, making it *timo.*

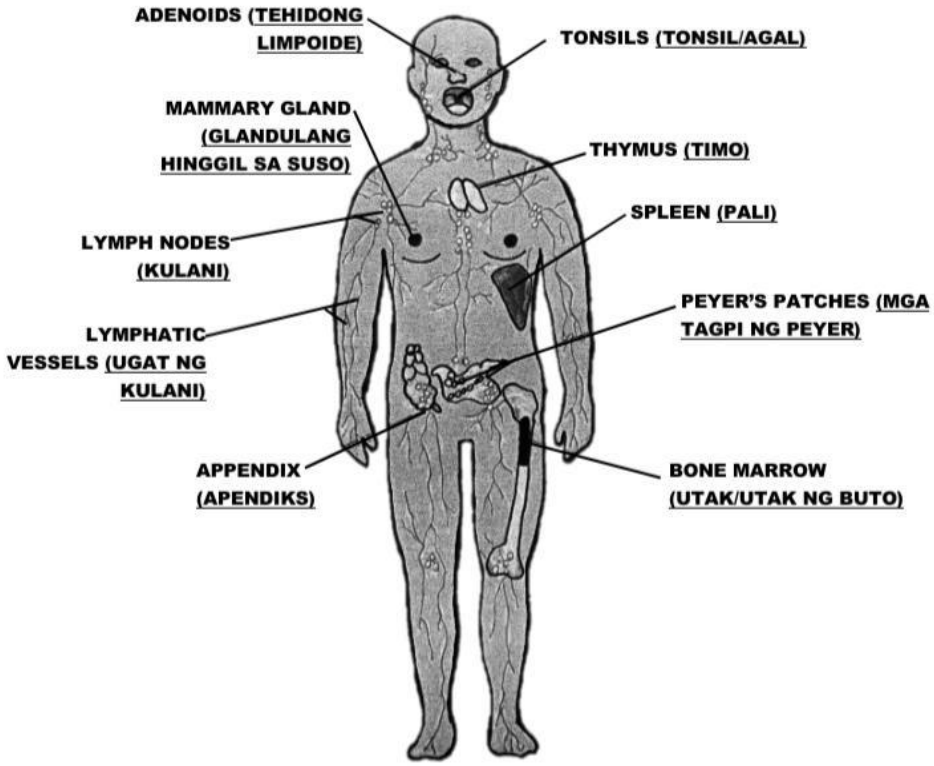

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Figure 18. Immune System

Figure 18 expresses the labelled anatomical structures together with the corresponding Filipino translation of the immune system, including the mammary gland as part of the exocrine system. In particular, the mammary gland *(glandulang hinggil sa suso)* is an exocrine gland that was translated using inversion and a meaning-based approach. Meanwhile, the terminologies that were translated based on their literal translation (indigenous/local use) were lymph nodes *(kulani),* spleen *(pali),* bone marrow *(utak/utak ng buto)* and tonsils *(tonsil/agal).* In terms of the decision-procedure approach, terms such as adenoids *(tehidong limpoide)* and thymus *(timo)* were translated based on their Spanish origin. There were also terms that were translated based on both inversion and direct approach, and those were lymphatic vessels *(ugat ng kulani)* and Peyer's patches *(mga tagpi ng Peyer).*

7. Conclusion and future directions

The central aim of this paper was to provide a comprehensive list of translated Filipino terminologies for the various organ systems covered by the biological discipline of anatomy and

physiology by employing an appropriate translation approach(es). Intellectualizing the Filipino language to function at a technical level and disseminating it in layman terminologies has been a significant focus noted in the literature to broaden access to linguistic knowledge and its benefits to better teach and learn specific disciplines such as science. Evidently, there are few publications regarding the utilization of Filipino in scientific terminology in science learning sessions. Hence, it is a perennial challenge for educators to accurately apply code-switching in the biological sciences, specifically anatomy and physiology, as one of the effective linguistic-borne pedagogies employed in the classroom. This paper emphasized the significance of adapting translation of scientific terms through their mother tongue as a receptor language and accurately applying the various approaches. These approaches in Filipino translation include the word-formation approach, the decision-procedure approach, the discipline-driven approach, the meaning-based translation, and the dynamic and functionalist approach (literal translation, oblique translation, and inverse translation). These approaches were obtained primarily from different linguistic books and scholarly studies supporting an appropriate switch between two languages (English-Filipino translation).

The use of the Filipino translation in each of the multi-organ systems was emphasized. These multi-organ systems are the nervous system, cardiovascular system, circulatory system, pulmonary/respiratory system, skeletal system, muscular system, accessory structures of the skeletal and muscular system, gastrointestinal/digestive system, genitourinary/excretory system, reproductive system (male and female), endocrine system, and immune system. In addition to these systems, the sensory organs (eye, ear, nose, and mouth) were also presented. Considering the comprehensive nature of the exposition, it can serve as a guide not just for the learners studying the sciences but also for the science teachers to utilize the suggested Filipino terminologies as their alternate medium of instruction in teaching science and/or anatomy and physiology classes, specifically when covering the structures of the body and their functions. Be it known that this paper focused mainly on the internal structures of the organ systems of the human body rather than the external and regional anatomical perspectives. Thus, further research can be conducted by focusing on the regional segments and outer structures (gross anatomy) of the human body.

Considering the reflexivity in practice, it is also recommended to first analyze the input language before translating it into the receptor language. In fact, there are numerous scientific terms and/or translations that cannot be covered by literal or machine translation alone, but rather require the utilization of other approaches. The knowledge and skill-set of the translator in technical translation and the native language of interest play an integral role in such a purview. To cite a few instances where the knowledge and skills of the translator assume a key factor in the translation practice, the term *aorta*, as appreciated in Figure 7, has no specified translation because of its nonexistence in literal and machine translation. Also, this cannot be attributed to some approaches due to a lack of direct attribution. Likewise, in Figure 2 (Semicircular canal and oval window), Figure 3 (Olfactory tract, Olfactory bulb, and Nasopharynx), Figure 9 (Epiglottis), and Figure 12 (Sigmoid colon), there is no translation included in this paper. To explicate a few, in Figure 2, oval window has a specific translation for each word. However, it cannot be translated as *tighabang bintana* because the main objective of code-switching as supported by the meaning-based approach is to retain its meaning, which will be lost if it is translated for each individual translation into Filipino terminology. Similarly, in Figure 12, the sigmoid colon is a term that cannot be translated because colon means *bituka* in Filipino terminology. However, it cannot be translated as *bitukang sigmoid* or *sigmoid na bituka* because the term sigmoid has a different

meaning in its input language. If these circumstances continue to be translated into Filipino, it might be misunderstood by the readers. By the same token, this study can also be expanded by providing an exposition of the specific anatomical structures, whether internal or external, with no specific translation.

Furthermore, assessing the context of each word before it is subjected to translation aids in the accuracy of meaning and switching of words, as there are words that sound similar but have different meanings. In line with this, words that sound similar but have different meanings should be considered when translating an input language into its receptor language. Figure 4, The Sensory Organ (Mouth), specifically the Filipino terminology for uvula, supports this. There are some machine translations that depict the translation for uvula as *kuntil*. However, this word should not be accepted as its Filipino equivalent as it is also commonly used as clitoris as part of the Reproductive System (Female) [External Genitalia]. Similarly, in the approach of translating the words tendon and ligament in Figure 11. They are accessory structures of the muscular and skeletal system that translate both these words into *lamad/litid* interchangeably by machine translation. Because ligament and tendon have distinct functions and meanings, they should not be translated into a single term and used interchangeably. In terms of the same Filipino terminology provided for the sublingual salivary gland, parotid salivary gland, and submandibular salivary gland as *glandula na panglaway* in Figure 13 (Gastrointestinal System), the researchers translated it as one because these three structures have the same function as the gland responsible for the discharge of saliva and lubrication of the mouth. What only differs is their anatomical location. These are just a few examples of the treasure troves embedded in the translation and code-switching of English to Filipino. It is also recommended for subsequent studies to investigate the words that are the same but with distinct meanings to choose their appropriate Filipino translation in consideration of the meaning-based approach.

In essence, the researchers now signify a clarion call for interested science and linguistic scholars that clarificatory and confirmatory research can be conducted to further progress the domain of translation and code-switching to ascertain the accuracy and reliability of the Filipino anatomical terminologies brought into the light by this exposition and compendium. The researchers fervently hope that this contribution to the advancement of scientific-linguistic literature on anatomy and physiology and the pragmatic compendium of translated Filipino words can lead to the holistic development of both the intellectualization of the Filipino language and the vibrant use of Filipino in technical courses like anatomy and physiology.

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Appendix A. Alphabetical List of Anatomical Structures with Translation*

Anatomical Terminology	Exact/Related Translation	Translation Approach/Technique	System of Origin
Achilles Tendon	Litid/Lamad na Achilles	Inversion	Muscular
Adenoids	Adenoyd/Tehidong limpoide	Discipline-driven Decision-procedure	Pulmonary/Respiratory; Immune
Abdominal muscles	Kalamnan sa tiyan	Meaning-based	Muscular
Adrenal gland	Glandulang hinggil sa bato	Inversion	Genitourinary/Excretory; Endocrine
Appendix	Apendiks	Decision-procedure	Gastrointestinal/Digestive
Artery	Arterya	Discipline-driven Decision-procedure	Circulatory; Genitourinary/Excretory
Ascending colon	Pataas na malaking bituka	Literal Translation	Gastrointestinal/Digestive
Auditory tube	Tubong pandinig	Inversion	Sensory Organ (Ear)
Auricle	Tainga	Literal Translation	Sensory Organ (Ear)
Biceps brachii	Biseps sa bisig	Decision-procedure Meaning-based	Muscular
Biceps femoris	Biseps sa hita	Decision-procedure Meaning-based	Muscular
Bladder	Pantog	Literal Translation	Reproductive (Male)
Bone Marrow	Utak/Utak ng buto	Literal Translation	Immune
Brain stem	Trongko Ensepaliko	Decision-procedure	Nervous (Outer)
Bronchi	Brongkiyos	Literal Translation	Pulmonary/Respiratory
Bronchioles	Brongkiyal (*Singular*)/Mga Brongkiyal (*Plural*)	Decision-procedure	Pulmonary/Respiratory
Calcarine sulcus	Kalkarayn na sulkus	Literal Translation	Nervous (Inner)
Canine	Pangil	Literal Translation	Sensory Organ (Mouth)
Carpals	Buto sa karpo	Meaning-based	Skeletal
Cartilage	Kartilago	Discipline-driven Decision-procedure	Accessory Structures
Caruncle	Karungkula	Decision-procedure	Sensory Organ (Eye)
Central sulcus	Gitnang sulkus	Literal Translation	Nervous (Inner/Outer)
Cerebellum	Serebelum/Serebelo	Decision-procedure	Nervous (Inner/Outer)
Cervical canal	Serbikal kanal	Literal Translation	Reproductive (Female)
Cervix	Pwerta	Literal Translation	Reproductive (Female)
Clavicle	Balagat	Literal Translation	Skeletal
Cochlea	Koklea	Discipline-driven	Sensory Organ (Ear)
Cochlear	Koklear	Decision-procedure Discipline-driven	Sensory Organ (Ear)
Colon	Kolon/Bituka	Literal Translation	Reproductive (Male)
Conjunctiva	Konhuntiba	Decision-procedure	Sensory Organ (Eye)
Coronary sulcus	Koronaryong sulkus	Decision-procedure	Cardiovascular
Corpus	Korpus	Decision-procedure	Nervous (Inner)
Cranium	Bungo	Literal Translation	Skeletal
Descending colon	Pababa na malaking bituka	Literal Translation	Gastrointestinal/Digestive
Diaphragm	Diyapragma/Bamban	Decision-procedure Literal Translation	Pulmonary/Respiratory
Diencephalon	Diyensepalo	Decision-procedure	Nervous (Inner)
Dorsal aorta	Panlikod na ayorta	Inversion	Genitourinary/Excretory
Ear canal	Daluyan paloob sa tainga	Meaning-based	Sensory Organ (Ear)
Epidydimis	Puno ng anurang punlay	Literal Translation	Reproductive (Male)
Esophagus	Lalangan	Literal Translation	Gastrointestinal/Digestive
Eyebrows	Kilay	Literal Translation	Sensory Organ (Eye)
Eyelashes	Pilikmata	Literal Translation	Sensory Organ (Eye)
Fallopian tube	Lagusan ng itlog	Meaning-based	Reproductive (Female)
Femur	Buto ng hita	Meaning-based	Skeletal

Anatomical Terminology	Exact/Related Translation	Translation Approach/Technique	System of Origin
Fibula	Buto ng binti	Meaning-based	Skeletal
Fimbriae	Sipit-sipitan	Literal Translation	Reproductive (Female)
Frontal bone	Pangharapan/Prontal na buto	Decision-procedure	Sensory Organ (Nose)
Frontal lobe	Pangharapan/Prontal na lobo	Decision-procedure	Nervous (Inner/Outer)
Frontalis	Kalamnan sa noo	Meaning-based	Muscular
Gallbladder	Apdo	Literal Translation	Gastrointestinal/Digestive
Gastrocnemius	Kalamnan sa ibabaw ng alak-alakan	Meaning-based	Muscular
Gingiva	Gilagid	Literal Translation	Sensory Organ (Mouth)
Gluteus maximus	Kalamnan sa puwit	Meaning-based	Muscular
Hard palate	Matigas na ngalangala	Literal Translation	Sensory Organ (Mouth)
Helix	Likaw	Literal Translation	Sensory Organ (Ear)
Hip bone	Buto ng balakang	Inversion	Skeletal
Humerus	Humero	Literal Translation	Skeletal
Hyoid bone	Buto ng baba	Inversion	Skeletal
Hypothalamus	haypotalamo/haypotalamus	Decision-procedure	Nervous (Inner); Endocrine
Incisor	Insisibo	Literal Translation	Sensory Organ (Mouth)
Incus	Ingkus	Discipline-driven	Sensory Organ (Ear)
Inferior vena cava	Nasa ibabang ugat	Meaning-based	Genitourinary/Excretory; Cardiovascular
Iris	Alikmata	Literal Translation	Sensory Organ (Eye)
Joint	Kasukasuan	Literal Translation	Accessory Structures
Kidney	Bato	Literal Translation	Genitourinary/Excretory
Lacrimal Gland	Glandulang Pangluha	Inversion Meaning-based	Sensory Organ (Eye)
Large intestine	Malaking bituka (*Singular*)/Mga malaking bituka (*Plural*)	Literal Translation	Gastrointestinal/Digestive
Larynx	Laringhe/Lalamunan/Babagtingan	Decision-procedure Literal Translation	Pulmonary/Respiratory
Left atrium	Kaliwang uka ng puso/Atriya	Decision-procedure	Cardiovascular
Left kidney	Kaliwang bato	Literal Translation	Genitourinary/Excretory; Excretory
Left lung	Kaliwang baga	Literal Translation	Pulmonary/Respiratory
Left Pulmonary artery	Kaliwang pangbagang arterya	Literal Translation	Cardiovascular
Left Pulmonary vein	Kaliwang pangbagang ugat	Literal Translation	Cardiovascular
Left ventricle	Kaliwang bentrikulo	Decision-procedure	Cardiovascular
Ligament	Ligamento	Discipline-driven Decision-procedure	Accessory Structures
Limbic lobe	Limbik na lobo	Literal Translation	Nervous (Inner)
Lips	Labi	Literal Translation	Sensory Organ (Mouth)
Liver	Atay	Literal Translation	Gastrointestinal/Digestive
Lobule	Lobulo	Literal Translation	Sensory Organ (Ear)
Lower eyelid	Talukap sa ilalim ng mata	Inversion	Sensory Organ (Eye)
Lymph nodes	Kulani	Literal Translation	Immune
Lymphatic vessels	Ugat ng kulani	Inversion Literal Translation	Immune
Malleus	Martilyo	Literal Translation	Sensory Organ (Ear)
Mammary gland	Glandulang hinggil sa Suso	Meaning-based Inversion	Immune; Excretory
Mandible	Panga	Literal Translation	Skeletal
Metacarpal	Metakarpo	Discipline-driven	Skeletal
Metacarpal bones	Buto sa metakarpo	Inversion	Skeletal
Midbrain	Gitnang parte ng utak	Literal Translation	Nervous (Inner)
Molars	Bagang	Literal Translation	Sensory Organ (Mouth)
Nasal cavity	Kabidad na pang-ilong/Lukab ng ilong	Inversion Meaning-based	Pulmonary/Respiratory; Sensory Organ (Nose)
Occipital lobe	Oksipital na lobo	Literal Translation	Nervous (Inner/Outer)

Anatomical Terminology	Exact/Related Translation	Translation Approach/Technique	System of Origin
Olfactory nerve	Hibla sa ugat ng olpatoryo	Meaning-based	Sensory Organ (Nose)
Oral cavity	Kabidad na pambibig	Inversion	Pulmonary/Respiratory
Ovarian ligament	Ligamento ng obariko	Inversion Decision-procedure	Reproductive (Female)
Ovary	Obaryo	Decision-procedure	Endocrine; Reproductive (Female)
Palate	Ngala-ngala	Literal Translation	Gastrointestinal/Digestive; Sensory Organ (Nose)
Palatine tonsil	Diris/Gutil	Literal Translation	Sensory Organ (Mouth)
Pancreas	Lapay	Literal Translation	Gastrointestinal/Digestive; Endocrine
Papillae of tongue	Papila ng dila	Literal Translation	Sensory Organ (Mouth)
Parietal lobe	Paryetal na lobo	Literal Translation Decision-procedure	Nervous (Inner/ Outer)
Parieto-occipital sulcus	Paryetal-oksipital na sulkus	Literal Translation	Nervous (Inner)
Parotid sublingual salivary gland	Glandula na panlaway	Inversion	Gastrointestinal/Digestive
Patella	Butong pantakip ng tuhod	Meaning-based approach	Skeletal
Pectoralis major	Kalamnan sa dibdib	Meaning-based approach	Muscular
Penis	Titi/Tite	Literal Translation	Reproductive (Male)
Peyer's Patches	Mga Tagpi ng Peyer	Inversion Literal Translation	Immune
Phalanges	Daliring pangkamay/pampaa	Meaning-based	Skeletal
Pharynx	Paringhe	Decision-procedure	Pulmonary/Respiratory
Pineal gland	Glandulang pineyal	Inversion	Endocrine; Nervous (Inner)
Pituitary gland	Glandulang Pituitarya	Inversion Discipline-driven	Endocrine; Nervous (Inner)
Placenta	Inunan	Literal Translation	Endocrine
Pleura	Saplot	Meaning-based	Pulmonary/Respiratory
Premolar	Talubagang	Literal Translation	Sensory Organ (Mouth)
Prostate	Prostata	Decision-procedure	Reproductive (Male)
Pulmonary/Respiratory trunk	Pangbagang trongko	Literal Translation Decision-procedure	Cardiovascular
Pupil	Balintataw	Literal Translation	Sensory Organ (Eye)
Radius	Bisig	Literal Translation	Skeletal System
Rectum	Tumbong	Literal Translation	Gastrointestinal/Digestive
Rectus femoris	Rektus ng hita	Decision-procedure Meaning-based	Muscular
Renal artery	Arterya ng bato	Inversion	Genitourinary/Excretory
Renal vein	Ugat ng bato	Inversion	Genitourinary/Excretory
Ribs	Tadyang	Literal Translation	Skeletal
Right atrium	Kanang uka ng puso/Atriya	Decision-procedure	Cardiovascular
Right coronary artery	Kanang hinggil sa arterya	Decision-procedure	Cardiovascular
Right kidney	Kanang bato	Literal Translation	Genitourinary/Excretory
Right lung	Kanang baga	Literal Translation	Pulmonary/Respiratory
Right Pulmonary artery	Kanang pangbagang arterya	Literal Translation	Cardiovascular
Right Pulmonary vein	Kanang pangbagang ugat	Literal Translation	Cardiovascular
Right ventricle	Kanang bentrikulo	Decision-procedure	Cardiovascular
Sartorius	Sartoryo	Decision-procedure	Muscular
Scapula	Paypay	Literal Translation	Skeletal
Sclera	Puti ng mata	Literal Translation	Sensory Organ (Eye)
Seminal vesicle	Punlayan	Literal Translation	Reproductive (Male)
Sinus	Saynus	Discipline-driven	Pulmonary/Respiratory

Anatomical Terminology	Exact/Related Translation	Translation Approach/Technique	System of Origin
Small intestines	Maliit na bituka (*Singular*)/Mga maliit na bituka (*Plural*)	Literal Translation	Gastrointestinal/Digestive
Soft palate	Malambot na ngalangala	Literal Translation	Sensory Organ (Mouth)
Spleen	Pali	Literal Translation	Immune
Stapes	Isteypis	Discipline-driven	Sensory Organ (Ear)
Sternum	Buto sa gitna ng dibdib	Meaning-based	Skeletal
Stomach	Tiyan	Literal Translation	Gastrointestinal/Digestive
Sublingual salivary gland	Glandula na panlaway	Inversion	Gastrointestinal/Digestive
Submandibular sublingual salivary gland	Glandula na panlaway	Inversion	Gastrointestinal/Digestive
Superior vena cava	Nakatataas na ugat	Meaning-based	Cardiovascular
Tarsals	Hinggil sa Tarsus	Literal Translation	Skeletal
Temporal lobe	Temporal na lobo	Literal Translation	Nervous (Inner/Outer)
Tendon	Lamad/Litid	Literal Translation	Accessory Structures
Testicle	Itlog/Bayag	Literal Translation	Reproductive (Male)
Thalamus	Talamo	Decision-procedure	Nervous (Inner)
Thymus	Timo	Decision-procedure	Endocrine; Immune
Thyroid/Parathyroid gland	Glandulang hinggil sa Lalamunan	Inversion	Endocrine
Tibia	Buto ng lulod	Meaning-based	Skeletal
Tongue	Dila	Literal Translation	Gastrointestinal/Digestive; Sensory Organ (Mouth)
Tonsils	Tonsil/Agal	Literal Translation	Immune
Trachea	Trakea	Discipline-driven	Pulmonary/Respiratory
Transverse colon	Pahalang na malaking bituka	Literal Translation	Gastrointestinal/Digestive
Trapezius	Trapesyo	Decision-procedure	Muscular
Triceps brachii	Triseps sa bisig	Decision-procedure Meaning-based translation	Muscular
Tympanic	Timpaniko	Decision-procedure Discipline-driven	Sensory Organ (Ear)
Tympanic membrane	Membranong timpaniko	Inversion	Sensory Organ (Ear)
Ulna	Kubito	Literal Translation	Skeletal
Upper eyelid	Talukap sa ibabaw ng mata	Inversion	Sensory Organ (Eye)
Ureter	Daluyan ng ihi	Meaning-based	Genitourinary/Excretory
Urethra	Lagusan ng ihi/Uretra	Meaning-based/Decision-procedure	Genitourinary/Excretory; Reproductive (Male)
Urinary bladder	Pantog	Literal Translation	Genitourinary/Excretory
Uterine fundus	Balat ng uterino	Inversion Decision-procedure	Reproductive (Female)
Uterus	Bahay-bata	Literal Translation	Reproductive (Female)
Uvula	Tilao/Tila-tilaukan/Ubula	Literal Translation	Sensory Organ (Mouth); Gastrointestinal/Digestive
Vagina	Puki/Puke	Literal Translation	Reproductive (Female)
Vas deferens	Anurang punlay	Literal Translation	Reproductive (Male)
Vein/Veins (Plural)	Ugat (*Singular*)/Mga Ugat (*Plural*)	Literal Translation	Circulatory
Vertebral column	Gulugod	Literal Translation	Skeletal
Vestibule	Bestibula	Literal Translation	Sensory Organ (Ear)
Vestibulocochlear	Bestibulokoklear	Decision-procedure Discipline-driven	Sensory Organ (Ear)
Vestibulocochlear nerve	Nerbyong bestibulokoklear	Inversion	Sensory Organ (Ear)

* All Literal Translations were verified with a machine translator [Machine Translation]

Appendix B. Alphabetical List of Anatomical Structures without Translation

Anatomical Terminology	System of Origin
Aorta	Cardiovascular
Cecum	Gastrointestinal/Digestive
Epiglottis	Pulmonary/Respiratory
Medulla oblongata	Nervous (Inner)
Nasopharynx	Sensory Organ (Nose)
Olfactory bulb	Sensory Organ (Nose)
Olfactory tract	Sensory Organ (Nose)
Oval window	Sensory Organ (Ear)
Pons	Nervous System (Inner/Outer)
Round window	Sensory Organ (Ear)
Semicircular canals	Sensory Organ (Ear)
Sigmoid Colon	Gastrointestinal/Digestive